



**DEPARTMENT OF B.SC MATHEMATICS**  
**PROGRAMME SPECIFIC OUTCOME**

**On the successful completion of B.Sc Mathematics programme, students will**

<b>PSO1:</b>	Understand the advanced concepts of Classical Algebra, Differential and Integral Calculus and get skills of applications of Differential and Integral calculus.
<b>PSO2:</b>	Understand the basic concepts of Three Dimensional Geometry and get the skills of applying them.
<b>PSO3:</b>	Study the basic Principles of Abstract Mathematics and Determine the solutions of Differential Equations and their applications.
<b>PSO4:</b>	Find approximate solutions to algebraic and transcendental equations. Acquire the knowledge of Transformation Techniques and Solve simultaneous equations arising out of real life situations using LPP techniques.
<b>PSO5:</b>	Learn the concepts of Modern Algebra. Analyse the Properties of Real and Complex numbers.
<b>PSO6:</b>	Study various statistical models and the algebra of Matrices and applying them to Vector spaces.
<b>PSO7:</b>	Acquire the knowledge on Numbers, in particular, Prime Numbers.
<b>PSO8:</b>	Get deep knowledge about Statics and Dynamic, thereby know where they apply to reach optimal solution to complex decision making problems using OR concepts.

**On the successful completion of M.Sc Mathematics programme, students will**

<b>PSO1:</b>	Understand the advanced concepts in Group Theory. Realize that how abstract concepts can be understood through concrete examples by studying Real Analysis.
<b>PSO2:</b>	Apply different statistical measures for testing the hypothesis and verify the validity of an argument by applying Propositional Logic and Learn the concept of Dual spaces and Inner product spaces and Understand the concept of Riemann integration and come to know integration and differentiation are inverse operations.
<b>PSO3:</b>	Study the fundamental features of Topology.



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<b>PSO4:</b>	Get the through knowledge of Galois Theory.
<b>PSO5:</b>	Acquire knowledge of Measure Theory and get skills of integrating functions without limit process.
<b>PSO6:</b>	Know basic Principles of Graph Theory and learn algorithms for solving real life problems using graph models. Know the decision making using optimization Techniques. Derive the equations of motions using different approaches. Know about Cryptography.
<b>PSO7:</b>	Solve different types of partial differential equations. Determine the solutions of the initial value problems of differential equations.
<b>PSO8:</b>	Have a deep study as classes of functions in Functional Analysis.

On successful completion of the **M.Phil. Mathematics** programme, students will

<b>PSO1:</b>	
<b>PSO2:</b>	
<b>PSO3:</b>	
<b>PSO4:</b>	
<b>PSO5:</b>	
<b>PSO6:</b>	

### **COURSE OUTCOMES**

#### **I B.Sc Mathematics**

#### **SEMESTER:I**

**Subject Name:Algebra**

**Subject Code:U2MAC11**

**In this course the students will**

<b>CO1:</b>	Determine the relations between the roots and coefficients.
<b>CO2:</b>	Get skills in transforming equations in one form into another.
<b>CO3:</b>	Find the solution of equations using Horner's method.
<b>CO4:</b>	Perform expansion of $\sin\theta$ , $\cos\theta$ , $\tan\theta$ and power of $\sin\theta$ and $\cos\theta$ , in terms of functions of multiples of $\theta$ .
<b>CO5:</b>	Understand hyperbolic functions and logarithm of complex numbers.



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**Subject Name: Differential Calculus**

**Subject Code:U2MAC12**

**In this course the students will**

<b>CO1:</b>	Acquire knowledge about Differential Calculus, subfield of Calculus.
<b>CO2:</b>	Understand that the derivative of a function at a chosen input value describes the rate of change of the function near that input value.
<b>CO3:</b>	Learn about envelopes and evolutes and know that evolute is the envelope of the normals to a curve.
<b>CO4:</b>	Find large number of industrial applications like the shape of cooking towers, mirrors used for long distance telescope.

**Subject Name: Sequences and Series**

**Subject Code:U2MASI**

**In this course the students will**

<b>CO1:</b>	Be able to describe a sequence in different ways.
<b>CO2:</b>	Classify the sequences as bounded, convergence and divergence.
<b>CO3:</b>	Write down the properties of monotonic sequences.
<b>CO4:</b>	Study general theorems on infinite series.
<b>CO5:</b>	Find the convergence of infinite series by various comparison tests.

### **SEMESTER: II**

**Subject Name: Integral Calculus**

**Subject Code:U2MAC21**

**In this course the students will**

<b>CO1:</b>	Get the skills of evaluating integrals by the method of substitution, integration of functions, integration of trigonometric functions, evaluation of definite integrals, reduction formula, double and triple integrals.
<b>CO2:</b>	Define the double integrals over a rectangle and triple integrals over parallelepipeds.
<b>CO3:</b>	Know the usage & integral calculus.
<b>CO4:</b>	Learn about space travel and Navigation.



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**Subject Name: Analytical Geometry 3D and Vector Calculus      Subject Code: U2MAC22**

**In this course the students will**

<b>CO1:</b>	Know various forms of equations of a plane in three dimensional space.
<b>CO2:</b>	Study vector differentiation and vector integration.
<b>CO3:</b>	Find the shortest distance between two skew lines.
<b>CO4:</b>	Understand the concept of Gradient, Curl and Divergence.
<b>CO5:</b>	Be able to evaluate line integrals and Surface integrals.

## **II B.Sc Mathematics**

### **SEMESTER: III**

**Subject Name: Differential Equations**

**Subject Code: U2MAC3**

**In this course the students will**

<b>CO1:</b>	Be Familiar with Legendre Euler and Bessel's equation.
<b>CO2:</b>	Get skill of solving the ordinary differential equations particularly homogeneous non-homogeneous equations.
<b>CO3:</b>	Acquire the knowledge of solving partial differential equations and understand boundary value problems.
<b>CO4:</b>	Get exposure to the concepts of charpits method first order equations.
<b>CO5:</b>	Know the application of differential equations in real life.

**Subject Name: Numerical Methods**

**Subject Code: U2MAA3**

**In this course the students will**

<b>CO1:</b>	Understand the various methods to solve algebraic and transcendental equations.
<b>CO2:</b>	Learn the methods to find solution of system of simultaneous linear equations.
<b>CO3:</b>	Develop the skills in solving problems in interpolation and inverse interpolation.
<b>CO4:</b>	Find the numerical derivatives by making use of numerical differentiation formula.
<b>CO5:</b>	Apply Newton cote's quadrature formula to solve problems in numerical integration.



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**Subject Name: Discrete Mathematics**

**Subject Code:U2MAS3**

**In this course the students will**

<b>CO1:</b>	Understand the theory of sets, relations and functions.
<b>CO2:</b>	Use the tool of mathematical induction.
<b>CO3:</b>	Acquire the knowledge of logics.
<b>CO4:</b>	Solve the recurrence relation.

**SEMESTER: IV**

**Subject Name: Modern Algebra**

**Subject Code:U2MAC4**

**In this course the students will**

<b>CO1:</b>	Learn the general algebraic structure of various sets such as Real numbers, Complex numbers, Matrices and Vector spaces.
<b>CO2:</b>	Know the usage of group theory to simplify differential equations.
<b>CO3:</b>	Learn a method to count the elements & a finite group.
<b>CO4:</b>	Construct quotient groups using an integral domain.
<b>CO5:</b>	Understand that with additional structure, more theorems could be proved, but the generality is reduced.

**Subject Name: Linear Programming**

**Subject Code:U2MAA4**

**In this course the students will**

<b>CO1:</b>	Understand origin & development of OR.
<b>CO2:</b>	Understand application of OR.
<b>CO3:</b>	Analyze the application of OR in second world war.
<b>CO4:</b>	Develop the skills in solving LPP using various methods.
<b>CO5:</b>	Understand the concept of travelling salesman problem and solve it by assignment method.



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**Subject Name: Transformation Techniques**

**Subject Code:U2MAS4**

**In this course the students will**

<b>CO1:</b>	Understand the method of applying Laplace transformation Techniques.
<b>CO2:</b>	Solve differential equation using inverse Laplace transform.
<b>CO3:</b>	Impart the knowledge of Fourier series.
<b>CO4:</b>	Acquire the knowledge of Fourier transform.

**III B.Sc Mathematics**

**SEMESTER:V**

**Subject Name: Graph theory and its applications**

**Subject Code:U2MAC51**

**In this course the students will**

<b>CO1:</b>	Gain the knowledge & the basic concepts of graph theory.
<b>CO2:</b>	Master the ways & solving real life problems using graph models.
<b>CO3:</b>	Develop the ability to apply various graph concepts in solving the challenging problems in real life.
<b>CO4:</b>	Possess the Knowledge & various important conjectures and established theorems in graph theory.

**Subject Name: Linear algebra and matrices**

**Subject Code:U2MAC52**

**In this course the students will**

<b>CO1:</b>	Gain knowledge about the basic concepts of vector spaces and linear transformations.
<b>CO2:</b>	Know the relationship between matrices and linear transformations.
<b>CO3:</b>	Become familiar with the rank of the matrices.
<b>CO4:</b>	Have thorough acquaintance with eigen values and eigen vectors.

**Subject Name: Modern Analysis**

**Subject Code:U2MAC53**

**In this course the students will**

<b>CO1:</b>	Acquire a conceptual understanding as the concepts such as infinite series, limits, continuity.
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<b>CO2:</b>	Understand the importance of formulating clear definitions.
<b>CO3:</b>	Gain experience in deductive reasoning.
<b>CO4:</b>	Acquire knowledge about compact space, connected space, complete space and learn how to apply these spaces to real life.

**Subject Name: Mathematical Statistics**

**Subject Code: U2MAA51**

**In this course the students will**

<b>CO1:</b>	Learn about the data interpretations and important concepts in mathematical statistics.
<b>CO2:</b>	Gain the knowledge of the characteristics of frequency distribution.
<b>CO3:</b>	Study the dispersion of a distribution of the individual values from a measure of central tendency.
<b>CO4:</b>	Learn moments, skewness kurtosis and curve fitting.
<b>CO5:</b>	Study different types of correlations, positive, negative, perfect and rank correlation.

**Subject Name: Mechanics**

**Subject Code: U2MAE51**

**In this course the students will**

<b>CO1:</b>	Learn about the statics branch of theoretical physics that uses probability theory.
<b>CO2:</b>	Have knowledge about the application of statics the field of mechanics.
<b>CO3:</b>	Acquire the knowledge about the dynamics branch of applied mathematics concerned with the study of forces and torques and their effect on motion as opposed to kinematics.
<b>CO4:</b>	Find the method & application of molecular bearing in the growing nanotechnology literature using classical molecular dynamics.
<b>CO5:</b>	Know the concepts of forces and resolution of forces and its applications.

**Subject Name: Fundamentals of Mathematics (NME)**

**Subject Code: U3MAN51**

**In this course the students will**

<b>CO1:</b>	Classify different types of equations and solve them.
<b>CO2:</b>	Be able to define sequence of numbers and understand progression as sequence.



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<b>CO3:</b>	Study different types of progressions and thereby study Arithmetic and Geometric means.
<b>CO4:</b>	Understand the notion of set and describe different types of sets.
<b>CO5:</b>	Possess the knowledge of Matrix and write down different types of matrices.
<b>CO6:</b>	Perform algebra of Matrices.

### SEMESTER: VI

**Subject Name: Complex Analysis**

**Subject Code:U2MAC61**

**In this course the students will**

<b>CO1:</b>	Demonstrate the idea of the Complex number system and work with arithmetic of complex numbers.
<b>CO2:</b>	Acquire a good knowledge of analytic functions in terms of power series approach, differentiability approach and the geometrical approach.
<b>CO3:</b>	Identify many important applications of line integrals and curve integrals by recalling Green's theorem, Stoke's theorem and Gauss Divergence theorem from vector calculus.
<b>CO4:</b>	Know the importance of improper integrals and the application of "Contour integration".
<b>CO5:</b>	Understand main ideas behind the elementary transformations like translation, rotation, homothetic transformation and inversion in transforming regions in the complex plane.

**Subject Name: Theory of Numbers**

**Subject Code:U2MAC62**

**In this course the students will**

<b>CO1:</b>	Acquire the knowledge of number theory.
<b>CO2:</b>	Learn the applications of Fermat's theorem, Euler's theorem and Wilson's theorem.
<b>CO3:</b>	Understand the concepts of primes and prime factorizations.
<b>CO4:</b>	Gather the knowledge of number theoretic functions.





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**Subject Name: Operation Research**

**Subject Code:U1MAC63**

**In this course the students will**

<b>CO1:</b>	Know about application of advanced analytical methods.
<b>CO2:</b>	Find an optimal solution to complex decision making problems.
<b>CO3:</b>	Acquire the knowledge of applications of inventory decisions which are relevant to undergraduate level.
<b>CO4:</b>	Know about the concept of queuing models networking problem.

**Subject Name: Advanced statistics**

**Subject Code:U2MAA61**

**In this course the students will**

<b>CO1:</b>	Learn the advanced level concepts in probability and random variable.
<b>CO2:</b>	Know the applications of statistics and to derive the properties of various distributions.
<b>CO3:</b>	Learn the mathematical theory of probability and the concept of random variables.
<b>CO4:</b>	Learn about some important distributions of random variable which are frequently used in statistics.
<b>CO5:</b>	Investigate the statistical data that deals with the study of some characteristics of a collection of objects.

**Subject Name: Applications of Differential Equation**

**Subject Code:U2MAS61**

**In this course the students will**

<b>CO1:</b>	Become aware of the important practical problems in which differential equations find their applications.
<b>CO2:</b>	Acquire a wide knowledge of practical problems which include the calculation of continuous compound interest and derivation of the equations of planetary motion using differential equations.
<b>CO3:</b>	Learn the method of developing mathematical models to real life problems using differential equation concept.
<b>CO4:</b>	Understand the importance of Brachistochrone problem and the tautochronous property of cycloid.



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**Subject Name: Random Process**

**Subject Code:U2MAS62**

**In this course the students will**

<b>CO1:</b>	Know that noise is a random process and Noise power, Noise correlation is possible only through a study of random process.
<b>CO2:</b>	Gain the knowledge wireless communication.
<b>CO3:</b>	Understand applications in communications such as properties of “fading” or random channel, noise properties and properties of digital modulation.
<b>CO4:</b>	Solve many other problems in correlation Ergodic process, and power spectral density function.

**I B.Sc Mathematics (Physics|Chemistry)**

**Subject Name: Ancillary Mathematics – I**

**Subject Code: U2MAA1X1**

**In this course the students will**

<b>CO1:</b>	Gain knowledge on various series like binomial series, logarithmic series, trigonometric series.
<b>CO2:</b>	Develop the ability to solve equations and understand the nature of roots of higher order equations.
<b>CO3:</b>	Acquire knowledge on hyperbolic functions.

**Subject Name: Ancillary Mathematics - II**

**Subject Code:U2MAA2X2**

**In this course the students will**

<b>CO1:</b>	Apply the reduction formula to solve problems in integral calculus.
<b>CO2:</b>	Utilize the concept of vector differentiation to identify the curl, divergence of a given vector.
<b>CO3:</b>	Construct the evolute of any curve using differential calculus.
<b>CO4:</b>	Develop the skills of solving simultaneous equations by marking use of the rank of matrices.
<b>CO5:</b>	Find the eigen values, eigen vectors of a given matrix.



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**II B.Sc Mathematics (Physics|Chemistry)**

**Subject Name: Ancillary Mathematics – III**

**Subject Code: U2MAA3X3**

**In this course the students will**

<b>CO1:</b>	Understand the concepts of differential equations, partial differential equations, Laplace transforms and Analytical geometry.
<b>CO2:</b>	Analyse various methods solving partial differential equations.
<b>CO3:</b>	Acquire skill to solve many problems in Laplace transform and in Analytical geometry.
<b>CO4:</b>	Understand that Laplace domain allows algebraic manipulation of differential equations.
<b>CO5:</b>	Understand the linear equations occur in subareas of mathematics and especially in applied mathematics.

**Subject Name: Ancillary Mathematics - IV**

**Subject Code:U2MAA4X4**

**In this course the students will**

<b>CO1:</b>	Learn the various statistical tools to analyse the data collected.
<b>CO2:</b>	Know the basic concepts of group theory.
<b>CO3:</b>	Have an introduction about the Fourier transformations and solving techniques.
<b>CO4:</b>	Gain knowledge in varieties of index numbers.

**I M.Sc Mathematics**

**SEMESTER: I**

**Subject Name: Group Theory**

**Subject Code: P2MAC11**

**In this course the students will**

<b>CO1:</b>	Learn the concept of group theory.
<b>CO2:</b>	Construct new groups from some groups already on hand.
<b>CO3:</b>	Learn the symmetry to analyse the object using group theoretic methods.
<b>CO4:</b>	Know about the concept of group, the algebraic structure such as rings, fields and vector spaces.
<b>CO5:</b>	Use group theory as a powerful tool research in robotics, computer vision, computer graphics and medical image analysis.



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Virudhunagar – 626 001.

**Subject Name: Real Analysis**

**Subject Code:P2MAC12**

**In this course the students will**

<b>CO1:</b>	Knowhow to connect abstract statement with concrete examples.
<b>CO2:</b>	Get experience in reading and writing proofs.
<b>CO3:</b>	Acquire more ideas about Calculus and Linear Algebra.
<b>CO4:</b>	Analyse the technical proofs and intuitive ideas.
<b>CO5:</b>	Learn how the principles and theory of Real Analysis can be applied in a variety of settings in subjects.

**Subject Name: Differential equations**

**Subject Code:P2MAC13**

**In this course the students will**

<b>CO1:</b>	Understand the method of solving initial value problems.
<b>CO2:</b>	Acquirethe knowledge of relationship between Wronstian and independent of solutions.
<b>CO3:</b>	Become familiar with Legendre, Euler and Bessel equations.
<b>CO4:</b>	Be able solve many types of partial differential equations.

**Subject Name: Statistics**

**Subject Code:P2MAC14**

**In this course the students will**

<b>CO1:</b>	Apply the different statistical measures for any data.
<b>CO2:</b>	Understand Statistics facilitates comparison.
<b>CO3:</b>	Formulate and test hypothesis.
<b>CO4:</b>	Attain several skill to solve various problems in all statistical concepts.
<b>CO5:</b>	Be able to deal with all sciences such as Biology, Zoology, Education, Economics, Planning, industry, Medical sciences.

**Subject Name:Discrete Mathematics**

**Subject Code:P2MAE11**



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Virudhunagar – 626 001.

**In this course the students will**

<b>CO1:</b>	Apply the rules of inference of Predicate and Propositional Logic to verify the validity of an argument.
<b>CO2:</b>	Apply formal proof techniques for reasoning problems.
<b>CO3:</b>	Analyze the growth of elementary functions and compare algorithms based on their computational complexity.
<b>CO4:</b>	Use basic and advanced counting techniques to solve combinatorial problems.
<b>CO5:</b>	Make a Model of finite state machines with and without output to perform simple tasks.
<b>CO6:</b>	Construct a Turing Machine to recognize the formal languages.

**SEMESTER:II**

**Subject Name: Rings and Vector Spaces**

**Subject Code:P2MAC21**

**In this course the students will**

<b>CO1:</b>	Understand the concept of dual spaces, inner product space.
<b>CO2:</b>	Know about the conversion & Clint data in to personality vector as part of scientific algorithm.
<b>CO3:</b>	Create the abstract concept of a vector space.
<b>CO4:</b>	Know about main application of the ring theory in cryptography area.
<b>CO5:</b>	Learn about the conversion documents in to word frequency vectors.

**Subject Name: Integration and Transformations**

**Subject Code:P2MAC22**

**In this course the students will**

<b>CO1:</b>	Understand the analytic properties of functions, sequences, convergence, limit of sequences, continuity, linear transformation, differentiation, etc.,
<b>CO2:</b>	Become familiar with the concept Riemann.
<b>CO3:</b>	Analyse inverse operations such as integration and differentiation.
<b>CO4:</b>	Try to analyse the problems that arise when limit processes are interchanged.

**Subject Name: Topology**

**Subject Code:P2MAC23**



**In this course the students will**

<b>CO1:</b>	Understand the terms and definitions of Topological Spaces, Accumulation Points, Interior, Closure, Boundary and exterior of sets, Coarser and Finer Topologies – Subspace and theorems related to topology.
<b>CO2:</b>	Bemotivated to unify the basics like open set, closed sets, components, continuity, completeness and so on, that are learned through one semester course on Real and complex analysis.
<b>CO3:</b>	Elaborate the knowledge of concepts such as connectedness and compactness.
<b>CO4:</b>	Recognize Bases and Subbases for topologies and write Topologies generated by classes of sets.
<b>CO5:</b>	Understand the importance of Metrizable topological spaces and know sufficient conditions for metrizability of a topological space.
<b>CO6:</b>	Use the concept of homeomorphism to identify the spaces that are having similar geometrical structures.

**Subject Name: Graph Theory**

**Subject Code:P2MAC24**

**In this course the students will**

<b>CO1:</b>	Know basic definitions & Graph theory.
<b>CO2:</b>	Use mathematical definitions to identify and construct examples and to distinguish the existence and non-existence of certain properties.
<b>CO3:</b>	Gather the graph theoretical knowledge and its application through algorithm.
<b>CO4:</b>	Identify special graphs and know related theorems.
<b>CO5:</b>	Solve some real time problems using the concepts of Graph theory.
<b>CO6:</b>	Apply graph as models for many standard problems.

**Subject Name: Number Theory and Cryptography**

**Subject Code:P2MAC25**

**In this course the students will**

<b>CO1:</b>	Apply the concept of divisibility and GCD.
<b>CO2:</b>	Understand the application of congruences in solving number theoretic problems.
<b>CO3:</b>	Learn more things on arithmetic functions and primitive roots.



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Virudhunagar – 626 001.

<b>CO4:</b>	Have introduction in cryptography.
<b>CO5:</b>	Be Enriched with the knowledge of doing research in number theory.

**Subject Name: Industrial Statistics (NME)**

**Subject Code:P2MAN2**

**In this course the students will**

<b>CO1:</b>	Understand the concept of statistical inference by testing hypothesis.
<b>CO2:</b>	Apply t-test for small samples.
<b>CO3:</b>	Understand the concept of control chart, types of control chart.
<b>CO4:</b>	Learn the construction of index numbers and uses of index numbers.
<b>CO5:</b>	Utilize the concept of time series to fit a given straight line and parabola.

## **II M.Sc Mathematics**

### **SEMESTER:III**

**Subject Name: Field Theory**

**Subject Code: P2MAC31**

**In this course the students will**

<b>CO1:</b>	Gain the knowledge of classifying a given field.
<b>CO2:</b>	Obtain the knowledge of extension fields and determining the dimension of the extension fields.
<b>CO3:</b>	Grasp the essence & Galois theory, an excellent composite of the theory of groups and the theory of algebraic field extensions.
<b>CO4:</b>	Acquire the knowledge of applications of field theory to the theory of equations and geometry.
<b>CO5:</b>	Be enriched with the knowledge of rings with chain conditions.

**Subject Name: Complex Analysis**

**Subject Code:P2MAC32**

**In this course the students will**

<b>CO1:</b>	Understand the concept of analytic functions, rational functions and multi-valued functions.
<b>CO2:</b>	Have thorough understanding of the concept of harmonic and Elliptic functions.
<b>CO3:</b>	Evaluate line integrals and determine winding number.
<b>CO4:</b>	Study the importance of Cauchy's theorem and Local correspondence theorem.
<b>CO5:</b>	Be able to state mean value property of Harmonic Functions and to know about



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Poisson's Integral and Schwartz Reflexion Principal.

**Subject Name: Numerical Methods**

**Subject Code:P3MAC33**

**In this course the students will**

<b>CO1:</b>	Solve an algebraic or transcendental equation using an appropriate numerical method.
<b>CO2:</b>	Approximate a function using Interpolation methods.
<b>CO3:</b>	Solve system of linear equations.
<b>CO4:</b>	Be able to determine Eigen values and Eigen vectors for any square matrices.
<b>CO5:</b>	Evaluate the derivative at a value using the techniques based on interpolations, finite difference operators, undetermined coefficients.

**Subject Name: Measure Theory**

**Subject Code:P2MAC34**

**In this course the students will**

<b>CO1:</b>	Acquire basic knowledge of measure theory needed to understand probability theory, statistics and functional analysis.
<b>CO2:</b>	Understand the fundamentals of measure theory and be acquainted with the proofs of the fundamental theorems underlying the theory of integration.
<b>CO3:</b>	Have an understanding of the use of mathematical concepts such as volume, area and integration.
<b>CO4:</b>	Learn the basics of integration that are useful in the applications in quantum mechanics, signal processing and so on.

**Subject Name:Applications of Graph theory**

**Subject Code:P3MAE31**

**In this course the students will**

<b>CO1:</b>	Understand Different algorithms involved in solving real life problems using graph models.
<b>CO2:</b>	Apply the graph solving techniques to research level.
<b>CO3:</b>	Learn the application of graph theory to solve real time.
<b>CO4:</b>	Gain awareness on the importance of Ramsey numbers.





VIRUDHUNAGAR HINDU NADARS' SENTHIKUMARA NADAR COLLEGE  
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**SEMESTER: IV**

**Subject Name: Optimization Techniques**

**Subject Code: P2MAC41**

**In this course the students will**

<b>CO1:</b>	Make divisions irrespective of the situation involved.
<b>CO2:</b>	Be able to compare the alternative courses of action for a problem.
<b>CO3:</b>	Evolve with the capability of minimizing the waiting time in a queue.
<b>CO4:</b>	Be capable of maximizing profit in a firm considering all the constraints.

**Subject Name: Functional Analysis**

**Subject Code:P2MAC42**

**In this course the students will**

<b>CO1:</b>	Learn the definition of banach space.
<b>CO2:</b>	Understand the importance of Hahn Banach theorem and the open mapping theorem.
<b>CO3:</b>	Study about Hilbert spaces and their properties.
<b>CO4:</b>	Classify the different types of operators with reference to a Hilbert space.
<b>CO5:</b>	Study in detail about Banach Algebras and their properties.

**Subject Name: Advanced Statistics**

**Subject Code:P2MAC43**

**In this course the students will**

<b>CO1:</b>	Learn several methods of mathematical statistics.
<b>CO2:</b>	Use the distributions such as binomial, poisson, gamma, chi-square and normal Distribution.
<b>CO3:</b>	Solve many problems which are given as exercise problems.
<b>CO4:</b>	Use the applications in Trade, Industry or Commerce, economics, biology, botany, astronomy, physics, chemistry, education, medicine, sociology, psychology or metrology.
<b>CO5:</b>	Be able to help in prediction and formulation of suitable policies.

**Subject Name: Combinatorics**

**Subject Code:P2MAC44**

**In this course the students will**



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<b>CO1:</b>	Solve counting problems by applying counting techniques using sum and product rule, permutation and combination.
<b>CO2:</b>	Construct generating functions and enumerators for permutations and combinations.
<b>CO3:</b>	Solve recurrence relation using generating functions.
<b>CO4:</b>	Use the Principle of Inclusion and Exclusion to identify the number of derangement of $n$ objects with restriction on relative positions.
<b>CO5:</b>	Apply Burnside's theorem to find the number of equivalence classes.
<b>CO6:</b>	Identify the weights and Inventories of equivalence class of functions using Polya's Fundamental theorem.

**Subject Name: Classical Mechanics**

**Subject Code: P2MAE41**

**In this course the students will**

<b>CO1:</b>	Have the ability to understand the concept of generalized co – ordinates.
<b>CO2:</b>	Learn to derive the equations of motion using the different approaches of Lagrange, Hamilton, Euler independently.
<b>CO3:</b>	Be aware of different variation principles.
<b>CO4:</b>	Understand the Canonical transformation to ease the solving process of equation of motion of the system that has been introduced to them.

### **COURSE OUTCOMES- M.Phil. Mathematics**

#### **SEMESTER 1**

**Subject Name: RESEARCH METHODOLOGY**

**Subject Code: M2MAC11**

**In this course the students will**

<b>CO1:</b>	Be introduced to Research concepts in Mathematics.
<b>CO2:</b>	Be familiar with Advanced topics in topology.
<b>CO3:</b>	Learn Recent trends in graph theory have been learned.

**Subject Name: ADVANCED ALGEBRA**

**Subject Code: M2MAC12**



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**In this course the students will**

<b>CO1:</b>	Be motivated to do research in algebra.
<b>CO2:</b>	Learn the advanced topics in algebra.
<b>CO3:</b>	Gain knowledge of ring theory.

**Subject Name: RESEARCH TOPICS IN GRAPH THEORY**

**Subject Code: M2MAE11**

**In this course the students will**

<b>CO1:</b>	Acquire the knowledge in Graph Theory.
<b>CO2:</b>	Be motivated to do research in Graph Theory.
<b>CO3:</b>	Study intensively three types of research topics in graph theory.

**Subject Name: DISTRIBUTIONS AND FOURIER TRANSFORMS**

**Subject Code: M2MAE12**

**In this course the students will**

<b>CO1:</b>	Acquire basic knowledge about the fourier transform of L1-functions.
<b>CO2:</b>	Be given motivation on the distributions, convolution of distributions and properties.
<b>CO3:</b>	Become familiar with the concept of tempered distributions, Fouriers transforms and Payley-Wiener theorems.