DEPARTMENT OF MATHEMATICS

Programme: M. Sc. Mathematics

VISION

To be among the top ten centers of excellence in Mathematics at the national level through quality Mathematics education and research.

MISSION

Department of Mathematics, through our enlightened management and committed faculty envisages to

- Provide world-class education to the students of Mathematics
- Give them a learning-centered environment
- Ensure knowledge transfer
- Instill research aptitude
- Infuse ethical and cultural values
- Transform our students into disciplined citizens in order to improve their quality of life.

Programme Educational Objectives (PEOs)

PEO1	The programme is designed to equip students with knowledge, skills and insight in Mathematics and related fields at an advanced level.
PEO2	The programme will enhance the independent learning ability and problem solving skills there by providing scope for lifelong learning.
PEO3	Increase the students caliber to crack competitive exams of various National and International reputed research Institutes.
PEO4	Motivate the students to do research in pure and applied Mathematics.
PEO5	Prepare students for a career in higher educational Institutions, IT industry and in major domains of Government and Private sectors.

Programme Outcomes (POs)

On successful completion of **M. Sc. Mathematics** programme, students will be able to

PO1	**Self-directed learning:** revisit and strengthen fundamental concepts and principles of various areas of Mathematics. (K_2)
PO2	**Disciplinary Knowledge:** gain necessary knowledge in the fundamental areas of mathematics such as Algebra, Analysis, Differential equations, Topology, Graph theory and Fluid Dynamics. (K_2)
PO3	**Analytical Reasoning:** create interest through effective teaching learning process in systematic understanding of the concepts and theories of Mathematics.(K_2)
PO4	**Research Related Skills:** trigger their understanding capacities and develop the required skills for writing research articles and projects (using LaTex software).(K_4)
PO5	**Multi-cultural competence:** select, interpret and perceive the signification of information from sources that include books, journals, scientific report and the internet. (K_3)
PO6	**Scientific Reasoning:** groom the students with necessary skill to apply mathematical concepts, analyze complex problems and draw reasonable conclusions. (K_4)
PO7	**Problem Solving:** identify unsolved problems, create new problems and articulate ideas and strategies to address the relevant research problem. (K_5)

Programme Specific Outcomes (PSOs)

PSO1	Students will be thoroughly exposed to almost all branch of Mathematics to clear CSIR, NET and GATE exams and pursue research in their interested area of Mathematics.
PSO2	Provides a platform to do projects individually or as a team and analyze a variety of real-world problems Mathematically.

Mapping

PEOs / POs \ PSOs	PEO1	PEO2	PEO3	PEO4	PEO5
PO1: Communication skills	H	H	H	H	H
PO2: Disciplinary knowledge	H	H	H	H	H
PO3: Critical thinking	H	H	H	H	H
PO4: Problem solving	H	H	H	H	H
PO5: Research related skills	H	H	H	M	H
PO6: Analytical reasoning	M	H	H	H	H
PO7: Self-directed learning	H	H	M	H	H
PSO1	H	H	H	M	H
PSO2	H	H	M	H	H

Programme Code:	M.Sc.	**Programme Title:**	M.Sc. Mathematics	
Course Code:	22PMS101	**Title**	**Batch:**	2022 -2024
		ALGEBRA	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	6		**Credits:**	4

Course Objective

Thiscourseenablethestudentstolearnseveraladvancedconceptsinalgebrasuchasstudyof Sylow's theorems, polynomial rings, extension and finite fields and Galois Theory.

Course Outcomes(CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall the concepts of group, ring, homomorphism and auto morphism.	K1
CO2	Understand the concepts of polynomial rings and Galois theory and solve related problems.	K2
CO3	ApplySylow'stheoreminsubgroupsandEinsteincriterionforirreducibility of polynomials over rationals.	K3
CO4	Analyze the concepts of finite fields,extension of fields, splitting field, normal extension, simple extension and fixed field.	K4
CO5	Pursue research in Algebra and inter disciplinary fields.	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	H	M	H	H
CO2	H	H	H	H	H	H	M	H	H
CO3	H	H	H	H	H	H	M	H	H
CO4	H	H	H	H	H	H	M	H	H
CO5	H	H	H	H	H	H	H	H	H

H-HIGH; M-MEDIUM; L-LOW.

Programme Code:	M.Sc.	**Programme Title:**	M.Sc.Mathematics	
Course Code:	22PMS102	**Title**	**Batch:**	2022 -2024
		REAL ANALYSIS	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	6		**Credits:**	4

Course Objective

This course will help students to understand the basic sof real analys is and to reading and writing mathematical proofs. It will lay the foundation for the subsequent study of complex analysis and functional analysis.

Course Outcomes (CO)

On successful completion of this core paper, the students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand and update the knowledge of Riemann-Stieltjes integrals, sequence and series of functions.	K2
CO2	Analyze the importance of uniform convergence with sequence of continuous, differentiable and integral functions.	K4
CO3	Analyze the consequences of Inverse function Theorem and the Implicit function Theorem.	K4
CO4	Apply the concept of Measure to the set of real numbers R and analyze its properties. Distinguish the concepts of Riemann integral and Lebesgue integral.	K3
CO5	Acquire sound knowledge in analysis and lead to pursue research in Mathematical sciences and allied fields.	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	H	M	H	M
CO2	H	H	H	H	H	H	M	H	M
CO3	H	H	H	H	H	H	M	H	M
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H-HIGH; M-MEDIUM; L-LOW.

Programme Code:	M.Sc.	**Programme Title:**	M.Sc. Mathematics	
Course Code:	22PMS103	**Title**	**Batch:**	2022 -2024
		COMPLEX ANALYSIS	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	6		**Credits:**	4

Course Objectives

Themain objectives ofthis courseare:

1. It enables the learners to understand and to evaluate the definite integrals in an easy andeffective way using calculus of residues.
2. It givesadeeperunderstandingintheadvancedtopicssuchasharmonicfunctions, Infinite products, canonical products and Normal families.

Course Outcomes (CO)

On successful completion of this core paper, the students will be able to

CO Number	CO Statement	Knowledge level
CO1	Understand the concepts and consequences of analyticity and the Cauchy-Riemann equations and the results on harmonic and entire functions including the fundamental theorem of algebra.	K2
CO2	Analyze complex contour integrals in several ways directly using parameterization and using Cauchy's theorem.	K4
CO3	Represent functions as Taylor, Power and Laurent series, classify singularities and poles, find residues and evaluate complex integrals using the residue theorem.	K5
CO4	Obtain deep knowledge in advanced to picssuchas infinite products, canonical products and normal families.	K4
CO5	Solve the problems using complex analysis techniques applied to different situations in engineering and other mathematical contexts which ensures to do research in this field.	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	M	H	M	M	H	M
CO2	M	H	H	H	M	H	H	H	M
CO3	M	H	H	H	H	H	M	H	M
CO4	H	H	H	H	H	H	M	H	M
CO5	M	M	H	H	H	H	H	H	H

H-HIGH; M-MEDIUM; L-LOW.

Programme Code:	M.Sc.	**Programme Title:**	M.Sc.Mathematics	
Course Code:	22PMS104	**Title**	**Batch:**	2022 -2024
		ORDINARY DIFFERENTIAL EQUATIONS	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	6		**Credits:**	4

Course Objective

This course introduces the formulation, classification of differential equations and existence and uniqueness of solutions.It also provides skill in solving initial value and boundary value problems and developing the skill in solving first and second order linear homogeneous and non-homogeneous differential equations using power series method.

CourseOutcomes (CO)

On successful completion of this course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recollect the preliminaries of analysis and calculus and understand the concept of Linear differential equations.	K2
CO2	Solve differential equations using power series method and applying the ideas of differential equations in a coherent and meaningful manner for solving real world problems.	K3
CO3	Formulate and solve linear systems using fundamental matrix and its propertiesandapplyinthefieldofindustrialorganizationengineeringand research.	K5
CO4	Analyze existence, uniqueness, other properties of a solution of differential equations and concepts of boundary value problems.	K4
CO5	Determine the real life problems beyond the classroom.	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	H	M	H	M
CO2	H	H	H	H	H	H	H	H	H
CO3	H	H	H	H	H	H	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H-HIGH; M-MEDIUM; L-LOW.

ProgrammeCode:	M.Sc.	**ProgrammeTitle:**	M.Sc.Mathematics	
Course Code:	22PMS1E1	**Title**	**Batch:**	2022 -2024
		MATLAB	**Semester:**	I
LectureHrs./Week or PracticalHrs./Week	4		**Credits:**	3

Course Objective

This course ensures the students to learn about the basics of MATLAB programming. It also enablesthestudentstogainknowledgeabouttheuseofloops,functions,operatorsandinsertion of plots using MATLAB commands.

Course Outcomes(CO)

On successful completion of this course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recollect the importance of conditional statements and the looping structure of the programming language.	K1
CO2	Understand and apply the basics of MATLAB.	K2
CO3	Apply the concepts of polynomials,curve fitting and interpolation in MATLAB.	K3
CO4	Apply arithmetic operations, display formats, plotting the curves and the concepts of arrays in MATLAB	K3
CO5	Competent in applying MATLAB for various applications	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	M	M	M	M	H	M
CO2	H	H	H	H	M	H	M	H	M
CO3	H	H	H	H	M	H	M	H	M
CO4	H	H	H	H	M	H	M	H	H
CO5	H	H	H	H	H	H	H	H	H

H-HIGH; M-MEDIUM; L-LOW.

ProgrammeCode:	M.Sc.	**ProgrammeTitle:**	M.Sc.Mathematics	
Course Code:	22PMS1E2	**Title**	**Batch:**	2022 -2024
		SPECIAL FUNCTIONS	**Semester:**	I
LectureHrs./Week or PracticalHrs./Week	4		**Credits:**	3

Course Objective

Toenablethelearnerstoobtainbasicknowledgeonfundamentalpropertiesofseveralspecial functions.

CourseOutcomes(CO)

On successful completion of this course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concept of Bessel's functions with its properties like recurrence relations, generating functions,etc.	K2
CO2	Perform operations with Orthogonal polynomials, Legendre's Polynomial with their differential equations along with the corresponding recurrence formula.	K3
CO3	Apply these techniques to solve and analyze various mathematical problems.	K3
CO4	Analyze the properties of special functions by their integral representations.	K4
CO5	Demonstrate how physical phenomena are modeled using special functions.	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	H	H	M	H
CO2	H	H	H	H	M	H	H	M	H
CO3	H	H	H	H	H	H	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H-HIGH; M-MEDIUM; L–LOW.

ProgrammeCode:	M.Sc.	**ProgrammeTitle:**	M.Sc.Mathematics	
Course Code:	22PMS1E3	**Title**	**Batch:**	2022 -2024
		PROGRAMMING LABINMATLAB	**Semester:**	I
LectureHrs./Week or PracticalHrs./Week	2		**Credits:**	2

Course Objective

Thiscourseensuresapracticalknowledgeforcreatingthevarioustypesof2Dand3Dplotsand computing the sub matrices from the existing matrix.

CourseOutcomes(CO)

On successful completion of this course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Apply the knowledge gained to create matrices and graphics.	K3
CO2	Apply the plotting commands in creating and editing2D and 3D plots.	K3
CO3	Apply the concept of matrix operations in MATLAB	K3
CO4	Evaluate the roots of the polynomial and the best fit of the function.	K5
CO5	Calculated instance of projectile singelement by element calculation.	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	M	H	H	M	H
CO2	H	H	H	H	M	H	H	M	H
CO3	H	H	H	H	M	H	H	M	H
CO4	H	H	H	H	M	H	M	M	H
CO5	H	H	H	H	H	H	H	M	H

H-HIGH; M-MEDIUM; L-LOW.

ProgrammeCode:	M.Sc.	**ProgrammeTitle:**	M.Sc.Mathematics	
Course Code:	22PMS205	**Title**	**Batch:**	2022 -2024
		LINEAR ALGEBRA	**Semester:**	II
LectureHrs./Week or PracticalHrs./Week	6		**Credits:**	4

Course Objective

Tomakethestudentunderstandtheconceptoflinearalgebraindetailandbythisstudentcan crack the linear algebra part in competitive examination and CSIR/NET examination.

Course Outcomes (CO)

On successful completion of this course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remember the concept which are basic to analysis of a single linear transformation on a finite dimensional vector space.	K1
CO2	Understand and get the idea of diagonalizable and nil potent part of a more general transformation, the rational and Jordan Canonical formula.	K2
CO3	Arrive the primary and cyclicde composition theorems and apply to study of admissible subspaces.	K3
CO4	Analyze the concepts of matrices over a polynomial domain and a concept of bilinear forms.	K4
CO5	Enrich knowledge of problem solving and pursue further research.	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	M	H	H	M	H	M
CO2	M	H	H	H	H	M	M	H	M
CO3	M	H	H	H	H	H	M	H	M
CO4	H	H	H	H	H	H	M	H	M
CO5	H	H	H	H	H	H	H	H	H

H-HIGH; M-MEDIUM; L-LOW.

ProgrammeCode:	M.Sc.	**ProgrammeTitle:**	M.Sc.Mathematics	
Course Code:	22PMS206	**Title**	**Batch:**	2022 -2024
		MATHEMATICAL STATISTICS	**Semester:**	II
LectureHrs./Week or PracticalHrs./Week	6		**Credits:**	4

Course Objective

Theobjectiveofthissyllabusistogiveasystematicintroductiontomodernprobabilitytheory and mathematical statistics

Course Outcomes (CO)

On successful completion of this course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of random variables, characteristic functions, probability distributions, samples and statistics.	K2
CO2	Calculate the expected value and higher moments of the distribution functions and probabilities associated with the distributions (normal, t, 2 and F) of random variables.	K3
CO3	Evaluate the properties of point estimators (consistency, efficiency, sufficiency) and their usefulness in decision-making problems.	K5
CO4	Constructing a confidence interval for the population mean, the difference between two population means, the true proportion, and the difference between the actual and the expected value.	K4
CO5	Formulate statistical hypothesis concerning means, difference between means and the variances of populations.	K4

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	M	H	M	H	H	M	H	M
CO2	H	H	H	M	H	H	M	H	M
CO3	H	H	H	H	H	H	M	H	M
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H-HIGH; M-MEDIUM; L-LOW.

Programme Code:	M.Sc.	**Programme Title:**	M.Sc. Mathematics	
Course Code:	22PMS207	**Title**	**Batch:**	2022 -2024
		PARTIAL DIFFERENTIAL EQUATIONS	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	5		**Credits:**	4

Course Objective

This course helps the students to understand linear and nonlinear partial differential equations and solving those using Charpit's and Jacobi's methods, methods of separation of variables and by method integral transforms. This course includes the study of Laplace equation, wave equation and diffusion equation and their classifications.

Course Outcomes (CO)

On successful completion of this course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand and classify partial differential equations to transform into canonical form.	K2
CO2	Gain good knowledge in applying Charpit's and Jacobi's methods, method of separation of variables and the method of integral transforms to obtain solutions of partial differential equations.	K3
CO3	Determine the canonical forms of second order PDEs and boundary value problems by Dirichlet and Neumann and apply the techniques to predict the behavior of certain phenomena.	K5
CO4	Evaluate the elementary solutions of Laplace equations and explain the problems with axial symmetry and demonstrate the ability tothink critically by developing appropriate mathematical models of physical systems .	K5
CO5	Analyze linear partial differential equations with constant and variable coefficients, boundary value problems and apply specific methodologies to conduct research and produce innovative results.	K4

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	H	M	H	M
CO2	H	H	H	H	H	H	M	H	H
CO3	H	H	H	H	H	H	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H-HIGH; M-MEDIUM; L-LOW.

ProgrammeCode:	M.Sc.	**ProgrammeTitle:**	M.Sc.Mathematics	
Course Code:	22PMS208	**Title**	**Batch:**	2022 -2024
		MECHANICS	**Semester:**	II
LectureHrs./Week or PracticalHrs./Week	6		**Credits:**	4

Course Objective

Thiscoursedealswithsomeofthekeyideasofclassicalmechanics.Theconceptscoveredinthe course include generalized coordinates, Lagrange's equations, Hamilton's equations and Hamilton - Jacobi theory.

CourseOutcomes (CO)

On successful completion of this course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate the knowledge of core principles in mechanics	K2
CO2	Analyze the motion of mechanical systems with constraints using Lagrangian description.	K2
CO3	Apply Hamilton's principle and gain proficiency in solving equations of motions.	K3
CO4	Analyze and apply the Hamilton-Jacobi theory in identifying conserved quantities.	K4
CO5	Identify the existing symmetries and the corresponding integrals of motion and analyze the qualitative nature of dynamics	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	M	H	H	M	M	H	M	H	M
CO2	M	H	H	H	H	H	M	H	M
CO3	M	H	H	H	H	H	M	H	M
CO4	M	H	H	H	H	H	M	H	M
CO5	M	H	H	H	H	H	H	H	M

H-HIGH; M-MEDIUM; L-LOW.

ProgrammeCode:	M.Sc.	**Programme Title:**	M.Sc.Mathematics	
Course Code:	22PMS209	**Title**	**Batch:**	2022 -2024
		NUMERICAL ANALYSIS	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	4		**Credits:**	3

Course Objective

This course enables the students to gain knowledge in solving Non-linear equations, Boundary value problems and characteristic value problems using MATLAB functions. It also provides the techniques to find the numerical solutions for ordinary differential equations using MATLAB.

Course Outcomes(CO)

On successful completion of this course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall the various numerical techniques in solvingset of equations using MATLAB	K1
CO2	Apply iterative methods to compute the solutions of non-linear equations using MATLAB within a specified tolerance.	K3
CO3	Analyze the concepts of interpolation to obtain difference table and to construct the polynomial for available data.	K4
CO4	Calculate the eigen values and eigen vectors of matrix using power method.	K5
CO5	Compute the solutions of ordinary differential equations by various numerical methods using MATLAB.	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	M	H	H	M	H	H	M	H
CO2	H	H	H	H	H	H	H	M	H
CO3	H	H	H	H	H	H	H	M	H
CO4	H	H	H	H	M	H	H	M	H
CO5	H	H	H	H	H	H	H	M	H

H-HIGH; M-MEDIUM; L-LOW.

Programme Code:	M.Sc.	**Programme Title:**	M.Sc. Mathematics	
Course Code:	22PMS210	**Title**	**Batch:**	2022 -2024
		PROGRAMMING LAB IN NUMERICAL ANALYSISUSING MATLAB	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	2		**Credits:**	2

Course Objective

Thiscourseenablesapracticalknowledgeforfindingthenumericalsolutionsofasystemofnon- linear equations and first order ordinary differential equations using MATLAB.

Course Outcomes(CO)

On successful completion of this course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Apply MATLAB to solve problems in numerical analysis.	K3
CO2	Find the solutions of first order ordinary differential equations in numerical analysis using MATLAB.	K4
CO3	Solve a system of linear equations using MATLAB and find the inverse matrix by Gauss Jordan method.	K4
CO4	Calculate eigen values and eigen vectors of the matrix using MATLAB.	K5
CO5	Evaluate numerical derivatives and numerical integrals using MATLAB.	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	M	H	M	M	H
CO2	H	H	H	H	M	H	H	M	H
CO3	H	H	H	H	M	H	H	M	H
CO4	H	H	H	H	M	H	H	M	H
CO5	H	H	H	H	M	H	H	M	H

H-HIGH; M-MEDIUM; L-LOW.

Programme Code:	M.Sc.	**Programme Title:**	M.Sc. Mathematics	
Course Code:	22PMS2N1	**Title**	**Batch:**	2022 -2024
		NME - MATHEMATICAL STATISTICSAND TECHNIQUES	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	1		**Credits:**	2

Course Objective

The aim of this paper is to train the students to improve the basic knowledge relevant to their majorsubjects.Thissyllabusenablesstudentstolearnabouttheconceptof AnalysisandTesting of Hypothesis**.**

Course Outcomes(CO)

On successful completion of this course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of Mean, Median and Standard deviation.	K2
CO2	Apply the concept of simple and rank correlation to real life problems.	K3
CO3	Apply the testing of hypothesis to Ztest, t-test, chisquare and F test.	K3
CO4	Analyze the concepts of chi-square test and apply the result in various field.	K4
CO5	Evaluate the concepts of Regression Analysis.	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	M	M	M	M	H	M	H	M
CO2	H	M	H	H	M	H	M	H	M
CO3	H	M	H	H	M	H	M	H	M
CO4	H	M	H	H	M	H	M	H	M
CO5	H	M	H	H	M	H	M	H	M

H-HIGH; M-MEDIUM; L-LOW.

Programme Code:	M.Sc.	**Programme Title:**	M.Sc. Mathematics	
Course Code:	22PMS2N2	**Title**	**Batch:**	2022 -2024
		NME - MATHEMATICSIN FINANCE	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	1		**Credits:**	2

Course Objective

The objective of this paper is to introduce the concepts of financial statement analysis which help the students to develop their financial skills.

Course Outcomes(CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recollect the concept of ratio analysis.	K1
CO2	Get the idea of liquidity ratio and capital structure ratio.	K2
CO3	Implement the concepts of return on investments.	K3
CO4	Analyze the basic concept of financial statement analysis.	K4
CO5	Apply the concept of profitability related to investment	K3

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	M	H	M	L	M	M	M	M
CO2	H	M	H	M	L	M	M	L	M
CO3	M	M	M	M	M	M	M	M	M
CO4	H	M	H	M	M	H	M	M	M
CO5	H	M	M	M	M	M	M	M	M

H-HIGH; M-MEDIUM; L-LOW.

VALUEADDEDCOURSE

Programme Code:	M.Sc.	**Programme Title:**	Mathematics	
Course Code:	22PMS2VA	**Title**	**Batch:**	2022 -2024
		INTERNETOF THINGS	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	2		**Credits:**	2*

Course Objectives

Thiscoursehighlightsonphysicaldesign,logicaldesign,enablingtechnologiesofIoT,IoT system management and design methodology.

Course outcomes(CO)

At the end of this course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To understand the basics of Internet of Things and design Of IoT	K1,K2
CO2	To learn the IoT Technologies	K2,K3
CO3	To learn IoT deployment Templates	K3,K4
CO4	To understand the design methodology and level Specification of IoT	K3,K4,K5
CO5	To learn about the physical devices such as Raspberry Pi	K3,K5

Programme Code:	M.Sc.	**Programme Title:**	M.Sc.Mathematics	
Course Code:	22PMS311	**Title**	**Batch:**	2022 -2024
		TOPOLOGY	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	6		**Credits:**	4

Course Objective

This course deals with the essentials of topological spaces and their properties in terms of continuity, connectedness, compactness etc.

Course Outcomes(CO)

After successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of topological spaces, continuity, homeomorphism, connectedness and compactness.	K2
CO2	Generate different topologies(product topology,metric topology, usual topology)and analyze the properties and inter relationships Between them.	K2,K4
CO3	Generalize the concepts like continuity, reconstruct homeomorphisms between topological spaces and solved related problems.	K4
CO4	Analyze separation axioms and the impact of metrization theorems in topology.	K4
CO5	Pursue research in different areas of topological spaces and find applications in the field of Engineering, Medicine, Agricultureand social studies.	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	H	M	H	M
CO2	H	H	H	H	M	H	M	H	M
CO3	H	H	H	H	H	H	M	H	M
CO4	M	H	H	H	M	M	H	H	M
CO5	M	M	H	H	H	H	H	M	H

H-HIGH; M-MEDIUM; L-LOW.

Programme Code:	M.Sc.	**Programme Title:**	M.Sc. Mathematics	
Course Code:	22PMS312	**Title**	**Batch:**	2022 -2024
		FUNCTIONAL ANALYSIS	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	6		**Credits:**	4

Course Objective

This course will enable the students to learn about the essentials of functional analysis. The course imparts an in-depth analysis of normed linear spaces, Banach spaces, Hilbert spaces etc. Further the course analyzes various properties of continuous linear functional, continuous linear operators and closed linear operators.

Course Outcomes (CO)

On successful completion of this core paper, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Have a clear understanding of Normed linear spaces, Banach spaces, Hilbert spaces and B(X,Y) and to give appropriate illustrations.	K2
CO2	Cherish how functional analysis uses and unifieside as from Linear Algebra and Analysis to handle infinite dimensional linear spaces andlinear mappings defined on them.	K4
CO3	Applysomeimportant,butsimpletofollowtheoremssuchasthebest approximation theorems,projection theorem and Riesz representation theorem.	K3
CO4	Have full grasp over important theorems of functional analysis namely Hahn-Banach theorem,the uniform bounded ness principle ,closed graph theorem, open mapping theorem and their applications.	K3
CO5	Apply thec oncepts and results covered in the courset on umerical analysis operator equations and also canpursue their research.	K4

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	M	H	M	H	M
CO2	M	H	H	H	H	M	M	H	M
CO3	H	H	H	H	H	H	M	H	M
CO4	H	H	H	H	H	H	M	H	M
CO5	M	H	H	H	H	H	H	H	H

H-HIGH; M-MEDIUM; L-LOW.

Programmed Code:	M.Sc.	**Programmed Title:**	M.Sc. Mathematics	
Course Code:	22PMS313	**Title**	**Batch:**	2022 -2024
		COMBINATORICS	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	6		**Credits:**	4

Course Objective

Combinatorial mathematics is concerned with counting the number of ways of arranging given objects in a particular way. Generating functions are used to solve a variety of Combinatorial problems.

Course Outcomes (CO)

On successful completion of th ecourse studentwill be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand a working knowledge of the basic ideas and techniques	K2
CO2	Derive the various aspects of assignment problems, beginning with the famous result of Philip Hall, and its applications.	K2
CO3	Understand and apply the Steiner systems(5,8,24)and the construction of Leech Lattice in 24 dimensions.	K3
CO4	Analyzetheconceptofblockdesignsanditsapplicationstoerrorcorrecting codes in computer applications.	K4
CO5	Evaluate the Rook polynomial in various boards.	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	M	M	H	M	H	M
CO2	M	H	H	H	H	H	M	H	M
CO3	M	H	H	H	M	H	M	H	M
CO4	H	H	H	H	H	H	H	H	H
CO5	M	H	H	H	H	H	H	H	H

H-HIGH; M-MEDIUM; L-LOW.

Programmed Code:	M.Sc.	**Programmed Title:**	M.Sc. Mathematics	
Course Code:	22PMS314	**Title**	**Batch:**	2022 -2024
		GRAPHTHEORY	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	6		**Credits:**	4

Course Objective

Graph theory is major area of Combinatory. In this course we introduce basic concept of graph theory and analyze some important concepts and make them to crack CSIR / NET examination graph theory which comes in discrete mathematics.

Course Outcomes (CO)

On successful completion of the course student will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the preliminaries of both undirected graphs and directed graphs.	K2
CO2	Visualize the concept of planar graph and connectivity and applying it.	K3
CO3	Apply the concept of Aurelian graph and Hamiltonian graph.	K3
CO4	Analyze both vertex coloring and edge-coloring as well as matching's in graphs.	K4
CO5	Enrich knowledge of problem solving and pursue further research.	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	M	H	H	M	H	M
CO2	H	H	H	H	H	H	M	H	M
CO3	H	H	H	H	H	H	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H-HIGH; M-MEDIUM; L-LOW.

Programmed Code:	M.Sc.	**Programmed Title:**	M.Sc. Mathematics	
Course Code:	22PMS3E1	**Title**	**Batch:**	2022 -2024
		LATEX	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	4		**Credits:**	3

Course Objective

This course provides students with an introduction to technical writing and computer presentation with LATEX, which is the de-facto standard in computer science, mathematics and many of sciences**.**

Course Outcomes(CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics of Latex and its usage.	K1
CO2	Understand and apply how to use various mathematical symbols and mathematical expressions,also how to insert figures and tables in document preparation.	K2
CO3	Apply the concepts of Latex commands in files.	K3
CO4	Prepare documents, reports and books for different environment**.**	K4
CO5	Enrich the knowledge of Latex and also how to use a various latex packages.	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	L	M	H	H	M	M	L	L
CO2	H	M	M	M	H	M	M	L	L
CO3	H	M	M	H	H	M	M	L	L
CO4	H	M	H	H	M	M	M	L	L
CO5	H	M	H	H	H	M	M	M	M

H-HIGH; M-MEDIUM; L-LOW.

Programmed Code:	M.Sc.	**Programmed Title:**	M.Sc. Mathematics	
Course Code:	22PMS3E2	**Title**	**Batch:**	2022 -2024
		MATHEMATICAL MODELLING	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	4		**Credits:**	3

Course Objective

ToenablethelearnerstoobtainbasicknowledgeinMathematicalModelling.

Course Outcomes(CO)

On the successful completion of the course, students will be able o

CO Number	CO Statement	Knowledge Level
CO1	Represent the real world systems from Science and Technology in a mathematical frame work.	K1
CO2	Acquire basic mathematical modeling skills to carry out simple tasks.	K2
CO3	Apply the mathematical techniques of Differential Equations in dynamics and Epidemics to analyze specific problems and identify the appropriate solutions.	K3
CO4	Formulate and qualitatively analyze mathematical models of a wide range of systems and processes in Engineering and the natural sciences	K4,K5
CO5	Develop the experience of working both independently and collaboratively within the discipline to other contexts.	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	H	H	M	H
CO2	H	H	H	H	H	H	H	M	H
CO3	H	H	H	H	H	H	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H-HIGH; M-MEDIUM; L–LOW.

Programmed Code:	M.Sc.	**Programmed Title:**	M.Sc. Mathematics	
Course Code:	22PMS3E3	**Title**	**Batch:**	2022 -2024
		PROGRAMMING LAB IN LATEX	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	2		**Credits:**	2

Course Objective

This course is designed to provide a practical exposure to the students on LATEX.

Course Outcomes(CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Apply cross section, cross reference, citation and bibliography in the book environment.	K3
CO2	Insert various types of mathematical symbols and pictures in Latex document.	K3
CO3	Draw various types of pictures by accessing LaTex draw.	K3
CO4	Prepare a sample article, dissertation in Latex environment.	K3
CO5	Competent in working with Latex.	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	M	M	L	H
CO2	H	H	H	H	H	M	M	L	H
CO3	H	H	H	H	H	M	M	L	H
CO4	H	H	H	H	H	M	M	L	H
CO5	H	H	H	H	H	H	H	L	H

H-HIGH; M-MEDIUM; L-LOW.

Programmed Code:	M.Sc.	**Programmed Title:**	M.Sc. Mathematics	
Course Code:	22PMS3AL	**Title**	**Batch:**	2022 -2024
		ADVANCED LEARNERCOURSE (OPTIONAL): ALGEBRAIC NUMBERTHEORY	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	-		**Credits:**	4*

Course Objectives

This course enables the learners

1. an algebraic point-of-view of number theoretic problems
2. torevisitconceptslikeprincipalidealringsandalgebraicextensions;andtoknownew concepts like No ethereal rings and Dedekind rings
3. to study algebraic proof of several numbers theoretic problems.

Course Outcomes (CO)

On completion of the course the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall the fundamental concepts of Rings and Ideals	K1
CO2	Understand the structure of Noetherian rings and Dedekind rings through analyzing examples	K2
CO3	Write minor proofs of Number theoretic results independently	K3
CO4	Analyze the logical arguments and to work in abstract concepts to increase the clarity and efficiency in algebraic number theory concepts	K4
CO5	Pursue further studies in number theory and related areas	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	M	H	H	M	H	M
CO2	H	H	H	H	H	H	H	H	M
CO3	H	H	H	H	H	H	M	H	M
CO4	M	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H-HIGH; M-MEDIUM; L-LOW.

CERFICATE COURSES

Programmed Code:	M.Sc.	**Programmed Title:**	M.Sc. Mathematics	
Course Code:	22PMS3CC	**Title**	**Batch:**	2022 -2024
		DATAANALYTICS USING PYTHON	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	2		**Credits:**	-

Course Objectives

Studentswilllearnhowtopreparedataforanalysis,performsimplestatisticalanalysis,create meaningful data visualizations, predict future trends from data, and more.

Course outcomes(CO)

At the end of this course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Apply data cleansing, transformation techniques and obtain descriptive statistics on data.	K3
CO2	Analyzed at sets and Create simple visualization plots of data.	K4
CO3	Compare them machine learning techniques.	K5
CO4	Develop machine learning models for chosen problems of classification and prediction.	K5
CO5	Create machine learning models for generating recommendations and clustering data.	K5

Programmed Code:	M.Sc.	**Programmed Title:**	M.Sc. Mathematics	
Course Code:	22PMS415	**Title**	**Batch:**	2022 -2024
		FLUIDDYNAMICS	**Semester:**	IV
Lecture Hrs./Week or Practical Hrs./Week	6		**Credits:**	4

Course Objectives

The main objectives of this course are:

1. To introduce and explain fundamentals of Fluid Mechanics, which are used in the applicationsofAerodynamics,Hydraulics,MarineEngineering,Gasdynamicsetc.
2. Tostudytheconceptssuchaskinematicsoffluid,incompressibleflowsandboundary layer theory in one, two and three dimensions.
3. Todeterminevolumetricflowrates,superpositions,shearandpressure,dragandlift forces for different geometric configurations.

Course Outcomes (CO)

On completion of the course the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall the fundamental knowledge of fluid, its properties and behavior under various conditions of internal and external flows.	K1
CO2	Understand the fundamental equations of viscous compressible fluid and get an idea about Bernoulli equation, Momentum theorems and their various applications.	K2
CO3	Analyze simple fluid flow problems like flow between parallel plates, flow through pipe etc., with Navies Stake's equation of motion.	K4
CO4	Understand and evaluate problems in two or three dimensional incised in compressible flows which are used in determining the mass flow rate of petroleum through pipelines, wind turbines, oil pipelines and air conditioning systems etc.,	K5
CO5	Understand the phenomenon of flow separation and boundary layer theory and extend their knowledge to pursue research in this field.	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	M	H	H	M	H	M
CO2	H	H	H	H	H	H	H	H	M
CO3	H	H	H	H	H	H	M	H	M
CO4	M	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H-HIGH; M-MEDIUM; L-LOW.

Programmed Code:	M.Sc.	**Programmed Title:**	M.Sc. Mathematics	
Course Code:	22PMS416	**Title**	**Batch:**	2022 -2024
		OPERATOR THEORY	**Semester:**	IV
Lecture Hrs./Week or Practical Hrs./Week	6		**Credits:**	4

Course Objective

This course will enable the students to obtain duals of certain sequence spaces and study some of the properties of such spaces namely reflexivity and weak convergence using duality consideration. Further the course enables to study about compact operators, spectral results for Banat space operators, and some operators on Hilbert spaces and various other properties of these operators.

Course Outcomes (CO)

On successful completion of this core paper, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the notions of Reflexivity, weak convergence and compact operators and to illustrate them with examples.	K2
CO2	Have a deep understanding of Spectrum, Resolvent set of an operator and Spectral mapping theorem.	K2
CO3	Apply the concept of linear isometric and dual spaces to acquire representations of duals of some sequence spaces.	K3
CO4	Have well founded knowledge about adjoin of an operator, self adjoin, normal, unitary operators and their properties.	K3
CO5	Pursue research purely or by applying the concepts and results covered in the course to operator equations, integral & differential equations and mathematical physics.	K4

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	H	M	H	M
CO2	M	H	H	H	H	H	M	H	M
CO3	H	H	H	H	H	H	M	H	M
CO4	H	H	H	H	H	H	M	H	M
CO5	M	H	H	H	H	H	H	H	H

H-HIGH; M-MEDIUM; L-LOW.

Programmed Code:	M.Sc.	**Programmed Title:**	M.Sc. Mathematics	
Course Code:	22PMS417	**Title**	**Batch:**	2022 -2024
		ALGEBRAIC TOPOLOGY	**Semester:**	IV
Lecture Hrs./Week or Practical Hrs./Week	6		**Credits:**	4

Course Objective

To introduce the ideas of algebraic topology to other branches of Mathematics and to find algebraic invariants that classify topological spaces up to homeomorphism, though usually most classify up to homogony equivalence.

Course Outcomes(CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic algebraic and geometric ideas that underpin homology theory.	K2
CO2	Apply knowledge of algebraic topology to formulate and solve problems of a geometrical and topological nature in mathematics.	K2
CO3	Apply methods from algebraic topology to problems in a broader mathematical context.	K3
CO4	Analyze the concept of homogony with proof or counter example as appropriate	K4
CO5	Evaluate simplified homology groups for applying in further research	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	H	M	H	H
CO2	H	H	H	H	H	H	M	H	H
CO3	H	H	H	H	H	H	M	H	H
CO4	H	H	H	H	H	H	M	H	H
CO5	H	H	H	H	H	H	H	H	H

H-HIGH; M-MEDIUM; L-LOW.

Programmed Code:	M.Sc.	**Programmed Title:**	M.Sc. Mathematics	
Course Code:	22PMS4E1	**Title**	**Batch:**	2022 -2024
		MATHEMATICAL METHODS	**Semester:**	IV
Lecture Hrs./Week or Practical Hrs./Week	6		**Credits:**	5

Course Objective

Thiscourseconcernstheanalysisandapplicationsofcalculusofvariationsandintegral equations. Applications include areas such as classical mechanics and differential equations.

Course Outcomes(CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall the fundamental concepts of integral equations.	K1
CO2	Understand the concepts of classical Fred holm theory, variation problems and field of externals.	K2
CO3	Analyze initial and boundary value problems and convert into Valera and Freehold integral equations.	K3
CO4	Evaluate the externals of various functional through different types of direct methods.	K5
CO5	Acquire the mathematical skillsrequired to solve eal world problems and pursue research.	K5

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	M	H	M	M	H	M
CO2	H	H	H	H	H	M	M	H	M
CO3	H	H	H	H	H	H	M	H	M
CO4	H	H	H	H	H	M	M	H	M
CO5	H	H	H	H	H	H	H	H	H

H-HIGH; M-MEDIUM; L-LOW.

Programme Code:	M.Sc.	**Programme Title:**	M.Sc. Mathematics	
Course Code:	22PMS4E2	**Title**	**Batch:**	2022 -2024
		FUZZY LOGIC ANDFUZZYSETS	**Semester:**	IV
Lecture Hrs./Week or Practical Hrs./Week	6		**Credits:**	5

Course Objective

On completion of the course the learners are expected to have

1. understood fuzzy sets, fuzzy relations and fuzzy measures
2. developed knowledge on uncertainty and information
3. studied several applications in science, arts and management.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall the concepts of set theory,crispsets and Measure theory.	K1
CO2	Understand the concepts of Fuzziness in various systems and fuzzy set theory.	K2
CO3	Analyze the difference between crispsets and fuzzyset theory.	K4
CO4	Develop the knowledge to deal different typesof uncertainties.	K4
CO5	Apply the concepts of fuzzy logic to solve real life problems in the field of medicine,social sciencesand decision making problems.	K3

Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	M	H	H	H
CO2	H	H	H	M	H	H	H	H	H
CO3	H	H	H	M	H	H	H	H	H
CO4	H	H	H	M	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H–HIGH;M–MEDIUM;L–LOW.

Programmed Code:	M.Sc.	**Programmed Title:**	Mathematics	
Course Code:	22PMS4P1	**Title**	**Batch:**	2022 -2024
		PROJECT	**Semester:**	IV
Lecture Hrs./Week or Practical Hrs./Week	6		**Credits:**	8

Components of the Project may be included the following

Review No.	Activity
I	Problem Identification and Related Literature collection
II	Analyzing of solving problems by applying different methodology
III	Giving conclusion

NALLAMUTHU GOUNDER MAHALINGAM COLLEGE POLLACHI

Dr. R. MUTHUKUMARAN,
M.A.,M.Phil.,B.Ed.,Ph.D..
PRINCIPAL
N.G.M. College, Pollachi - 642 001
Coimbatore District