Name of th	e Programme			Master of Science in Mathematics		
Name of the Programme						
Short Name of the Programme				MSc Mathematics		
Code of the	Programme			MTH		
		PROGRA	MME O	UTCOMES - POs		
SI. NO	CO No:	Programme Outcomes				
1	PO 1	Acquire the ability to appinterventions.	ly the bas	ic principles of logic and science to thoughts, actions and		
2	PO 2	Perceive knowledge as a c	comprehe	nsive, interrelated and integrated faculty of the human mind.		
3	PO 3	Generate hypothesis and a thinking.	articulate	assent or dissent by employing both reason and creative		
4	PO 4	1 *	-	rogressive direction for actions and interventions by learning onic ideology within certain dominant notions.		
5	PO 5	Develop self-critical abili- plural perspectives.	ties and th	ne ability to view positions, problems and social issues from		
6	PO 6	_		hering to the principles of scientific temper, sovereignty, nd the values that guide a republic.		
7	PO 7	Develop gender sensitive attitudes, environmental awareness, the ability to understand and resist various kinds of discriminations and empathetic social awareness about various kinds of marginalization.				
8	PO 8	Understand the issues related to the current environmental problems and apply the principles of science for a sustainable development in an interdisciplinary manner.				
9	PO 9	Develop communication skill in English and local languages through different media.				
10	PO 10	Learn to articulate analysis, synthesis, and evaluation of situations and themes in a scientific manner.				
11	PO 11	Develop aesthetic, social, humanistic and artistic sensibilities for problem solving and evolving a comprehensive perspective.				
12	PO 12	Attain a high level of scientific excellence, and develop hand-pick and apply appropriate techniques, resources and modern technologies for sustainable development.				
	PROGRAMME SPECIFIC OUTCOMES - PSOs					
SI. NO	CO No:	Programme Specific Outcomes				
1	PSO 1	A solid understanding of graduate level algebra, analysis and topology.				
2	PSO 2	Using their mathematical knowledge to analyse certain problems in day to day life.				
3	PSO 3	Identifying unsolved yet relevant problems in a specific field.				
4	PSO 4	Undertaking original research on a particular topic.				
5	PSO 5	Communicate mathematics accurately and effectively in both written and oral form.				
6	PSO 6	Conducting scholarly or p	profession	al activities in an ethical manner.		
	COURSE OUTCOMES - COs					
Semester	Course code	Course Title	CO No:	Course Outcomes		

MTH1C01 ALGEBRA - I ALGEBRA -				CO1	Learn factor group computation.
MTH1C01 ALGEBRA - I CO3 Loarn Sylow theorems and its applications. CO4 Understand the notion of free groups. CO5 Understand the concept rings of polynomials. CO6 Learn group presentation. CO7 Understand the relation between linear transformations and matrices. Understand the concept of diagonalizable and triangulable operators and various fundamental results of these operators. CO4 Understand Primary decomposition Theorem. CO5 Learn basic properties inner product spaces. CO4 Understand Primary decomposition Theorem. CO5 Learn basic properties inner product spaces. CO4 Understand Primary decomposition Theorem. CO5 Learn basic properties inner product spaces. CO4 Learn the topology of the real line. CO2 Understand the notions of Continuity, Differentiation and integration of real functions. CO3 Learn basic properties inner product spaces. CO4 Learn the topology of the real line. CO5 Understand the fundamentals of Graph Theory Learn the structure of graphs and familiarize the basic concepts to analyze different problems in different branches. CO5 CO6 Learn the structure of graphs and familiarize the basic concepts to analyze different problems in different branches. CO5 Learn the structure of graphs and familiarize the basic concepts to analyze different problems in different branches. CO6 Learn the concepts of partial order relation and total order relation. CO7 Learn the concepts of partial order relation and total order relation. CO8 Learn the concept of quadratic residues and Quadratic reciprocity laws. CO9 CO9 Learn the concept of quadratic residues and Quadratic reciprocity laws. CO9 CO9 Learn the concept of gloud ratic residues and Quadratic reciprocity laws. CO9 CO9 Learn the concept of measures and measurable functions. CO9 Learn the concept of measures and measurable functions. CO9 Learn bow to apply Galois Theory in various contexts. CO9 Learn the concept of measures and measurable functions. CO9 Learn the concept of measures and measurable functions. CO9 Learn bow to					
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CO3 Learn Lebesgue integration and its various properties. CO4 Learn how to generalize the concept of measure theory.				666	
CO4 Learn how to generalize the concept of measure theory.		MTH2C07			·
CO5 Learn that a measure may take negative values.					
, ,				CO5	
Be proficient in the abstract notion of a topological space,					· ·
CO1 where continuous function are defined in terms of open set				CO1	·
					not in the traditional ϵ – δ definition used in analysis.
					not in the traditional ε – δ definition used in analysis.

1	I	ı		Realize Intermediate value theorem is a statement about
			CO2	connectedness, Bolzano weierstrass theorem is a theorem
	MTH2C08	TOPOLOGY		about compactness and so on.
			CO3	Learn the concept of quotient topology.
				Learn five properties such as T0, T1, T2, T3 and T4 of a
				topological space X which express how rich the open sets is.
			CO4	More precisely, each of them tells us how tightly a closed
2				subset can be wrapped in an open set.
_				Learn the existence of uniqueness of solutions for a system
			CO1	of first order ODEs.
				Learn many solution techniques such as separation of
			CO2	variables, variation of parameter, power series method,
		ODE AND CALCULUS OF		Frobeniious method etc.
	MTH2C09	VARIATIONS		Learn method of solving system of first order differential
			CO3	calculus equations.
				Get an idea of how to analyze the behavior of solutions
			CO4	such as stability, asymptotic stability
			CO5	Get a basic knowledge of Calculus of variation.
				Learn graphical method and the simplex algorithm for
			CO1	solving a linear programming problem.
				Learn more optimization techniques for solving the linear
			CO2	programming models - transportation problem and integer
	MTH2C10	OPERATIONS RESEARCH		programming problem.
	WITHZCIU	OPERATIONS RESEARCH	CO3	Learn optimization techniques for solving some network
			COS	related problems.
				Learn sensitivity analysis and parametric programming,
		CO4	which describes how various changes in the problem affect	
				its solution.
			CO1	Be proficient in differentiation of functions of several
				variables.
			CO2	Understand curves in plane and in space.
			CO3	Get a deep knowledge of Curvature, torsion, Serret-Frenet
		MULTIVARIABLE		formulae.
	MTH3C11	CALCULUS AND GEOMETRY	CO4	Learn Fundamental theorem of curves in plane and space.
			CO5	Learn the concept of Surfaces in three dimension, smooth
				surfaces, surfaces of revolution.
			CO6	Learn explicitly tangent and normal to the surfaces.
			607	Get a thorough understanding of oriented surfaces, first
			CO7	and second fundamental forms surfaces, gaussian curvature
				and geodesic curvature and so on.
	MTH3C12	COMPLEX ANALYSIS	CO1	Learn the concept of (complex) differentiation and integration of functions defined on the complex plane and
			COI	their properties.
				Be thorough in power series representation of analytic
			CO2	functions, different versions of Cauchy's Theorem.
				Get an idea of singularities of analytic functions and their
			CO3	classifications.
			CO4	Learn different versions of maximum modulus theorem.
	MTH3C13	FUNCTIONAL ANALYSIS		Learn the concept of normed linear spaces and Hilbert
			CO1	spaces.
			602	Learn various properties operators defined on both normed
			CO2	and Hilbert spaces.
			CO3	Understand the concept dual space.
1 1				

		CO4	Learn the completeness of the space bounded linear
			operators. Learn a technique to solve first order PDE and analyse the
		CO1	solution to get information about the parameters involved
		001	in the model.
			Learn explicit representations of solutions of three
MTH3C14	PDE AND INTEGRAL	CO2	important classes of PDE Heat equations Laplace equation
	EQUATIONS	55-	and wave equation for initial value problems.
		CO3	Get an idea about Integral equations.
			Learn the relation between Integral and differential
		CO4	Equations.
		CO1	The basics of coding theory.
		CO2	Learn to detect and correct the error patterns.
		602	Learn to implement the fundamental concepts in linear
MTH3E01	CODING THEORY	CO3	algebra to coding theory.
WITHSEUT	CODING THEORY	CO4	Understand about different types of coding and decoding
		C04	methods and develop the problem solving ability.
		CO5	Attain the skills to represent cyclic codes in terms of
		603	polynomials.
		CO1	Understand the fundamentals of cryptography and
		601	cryptanalysis.
			Acquire a knowledge of Claude Shanon's ideas to
		CO2	cryptography, including the concepts of perfect secrecy and
			the use of information theory to cryptography.
MTH3E02	CRYPTOGRAPHY		Learn to use substitution -permutation networks as a
		CO3	mathematical model to introduce many of theconcepts of
			modern block cipher design and analysis including
			differential and linear cryptoanalysis.
		CO4	Familiarize different cryptographic hash functions and their
			application to the construction of message authentication
			codes. Learn how a measure will be helpful to generalize the
		CO1	concept of an integral.
	MEASURE AND INTEGRATION		Learn how a smallest sigma algebra containing all open sets
			be constructed on a topological space which ensures the
			measurability of all continuous function and how a measure
		CO2	called Borel measure is defined on this sigma algebra which
MTH3E03			ensures the integrability of a hugeclass of continuous
WITTISLOS			functions.
		CO3	Understand the regularity properties Borel measures.
			Realize a measure may take real values even complex
		CO4	values.
		CO5	Learn to characterize bounded linear functionals on L p .
		CO6	Learn product measure and their completion.
		CO1	Understand the concept of random variables, probability
			and distribution function of a random variable.
		CO2	Apply the knowledge of convergence a sequence of random
			variables almost surely, in probability and distribution.
	PROBABILITY THEORY	CO3	Apply the knowledge of central limit theorem in relevant
MTH3E04			situations.
		CO4	Develop problem solving techniques to solve real world
			problems.

			CO5	Able to translate real world problems into probability models.
			CO6	Evaluate and apply moments and characteristic functions and understand the concept of inequalities.
			CO1	Understand the concept of mequalities. Understand the notions of Fredholm theory of compact Operators and their properties
	NATUAC1E	ADVANCED	CO2	Apply the theory to understand and solve some problems
	MTH4C15	FUNCTIONAL ANALYSIS	CO3	of integral equations at an appropriate level of difficulty. Describe the construction of the spectral integral.
				Recognize the fundamentals of Banach spaces and Banach
			CO4	Algebras.
				Get a deep knowledge about the space of continuous
			CO1	functions from an open set in the complex plane to a region
				of the complex plane. Learn a technique to extend the domain over which a
	MTH4E05	ADVANCED COMPLEX	CO2	complex analytic function is defined.
		ANALYSIS		Understand that there is a unique conformal map f of the
			CO3	unit disk onto a simply connected domain of the extended
				complex plane such that f(0) and arg f'(0) take given values.
			CO4	Express some functions as infinite series or products.
			CO1	Understand that abstract algebra may be used to solve certain problems in Number Theory.
		-	CO2	Learn about arithmetic of algebraic number fields.
				Understand that the familiar unique factorization property
		ALGEBRAIC NUMBER	CO2	may fail in the case of ring of integers of some quadratic
	MTH4E06	THEORY	CO3	fields while a unique factorization theory holds for ideals of
		THEORY -		ring of integers of a number field.
			CO4	Learn finiteness of class numbers.
			CO5	Understand that the notions of algebraic numbers may be applied to prove Kummer's special case of Fermat's Last
			COS	Theorem.
			601	Learn how basic geometric structures may be studied by
	MTH4E07	ALGEBRAIC TOPOLOGY	CO1	transforming them into algebraic questions.
			CO2	Learn basics of homology theory and apply it to get a
				generalization of Eulers formula to a generalpolyhedral.
			CO3	Learn to associate a group called fundamental group to every topological space.
4				Learn that two objects that can be deformed into one
			CO4	another will have the same homology group and that
				homemorphic spaces have isomorphic fundamental groups.
			CO5	Learn Brouwer fixed point theorem and related results.
	NATUATOO		CO1	Basic properties of commutative rings, ideals and modules
		COMMUTATIVE - ALGEBRA -		over commutative rings.
	MTH4E08		CO2	Learn uniqueness theorem for a decomposable ideal.
			CO3	Learn integrally closed domain and valuation ring. Understand the basic theory of Noetherian and Artin Rings.
				Understand how calculus of several variables can be used to
			CO1	develop the geometry of n dimensional oriented n- surface
		DIFFERENTIAL		in
	MTH4E09		CO2	Understand locally n- surfaces and parametrized n- surfaces
		GEOMETRY		are the same.

Develop a knowledge of the Gauss and Weingarten maps and apply them to apply them to describe various properties of surfaces. Learn the concept of Equation of Motion and how they relate the dynamics of flow to the pressure and density fields. CO2	1				To 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
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				CO3	Learn the concepts of induced representations and normal
MTH4E13 WAVELET THEORY $\begin{array}{ c c c c c c c c c c c c c c c c c c c$				603	subgroups.
MTH4E13 WAVELET THEORY basic properties.		MTH4E13	WAVELET THEORY	CO1	Learn the concept of discrete Fourier Transforms and its
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602				CO2	Learn how to construct Wavelets on \mathbb{Z} N and \mathbb{Z} .
$oxed{Learn}$ $oxed{Learn}$ $oxed{Wavelets}$ on $oxed{\mathbb{K}}$ and construction of MRA.				CO3	Learn Wavelets on $\mathbb R$ and construction of MRA.