LOYOLA COLLEGE OF ARTS AND SCIENCE (Co-Ed.)

(Affiliated to Periyar University – Salem)
Accredited by NAAC with 'B' Grade (I Cycle)
Recognised under section 2(f) of the UGC Act 1956
Mettala, Oilpatty Village,
Rasipuram Taluk, Namakkal District – 636202.

DEPARTMENT OF MATHEMATICS

Under Graduate Programme

Programme Outcomes:

PO1: Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.

PO2: Critical Thinking: Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.

PO3: Problem Solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's earning to real life situations.

PO4: Analytical Reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints.

PO5: Scientific Reasoning: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.

Loyola College of Arts & Science (Co.Ed) Oilpatty, Namakkal Dt.

PO6: Self-directed & Lifelong Learning: Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including "learning how to learn", through self-placed and self- directed learning aimed at personal development, meeting economic, social and cultural objectives.

B.Sc MATHEMATICS

Programme specific outcomes:

PSO1: Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics.

PSO2: Understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields.

PSO3: To prepare the students who will demonstrate respectful engagement with other's ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions. To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) can be carried out accordingly, assigning the appropriate level in the grids:

	POs							PSOs		
	1	2	3	4	5	6	...	1	2	...
CLO1										
CLO2										
CLO3										
CLO4										
CLO5										

23UMACT08	**ELEMENTS OF MATHEMATICAL ANALYSIS**	**CLO 1**	Explain in detail about sets and functions, equivalence and countability and the LUB axiom
		CLO 2	Explain Sequence and Subsequence of real numbers and to find the limit of sequence to test for convergent, divergent, bounded and monotone sequences
		CLO 3	Explain the operations on convergent and divergent sequences and to Explain the concepts of limit superior and limit inferior and the notion of Cauchy sequences
		CLO 4	Classify the series of real numbers and the alternating series and their convergence and divergence, the conditional convergence and absolute convergence and solve problems on convergence of the sequences
		CLO 5	Explain about the metric spaces and functions continuous on a Metric space
23UMACT07	**INDUSTRIAL STATISTICS**	**CLO 1**	Define Combinatorial Methods and few examples
		CLO 2	Define Sample spaces and The Probability of event
		CLO 3	Describe Independent Events and problems
		CLO 4	Define Probability Distributions ,Continuous Random variables
		CLO 5	Describe Conditional Distributions and Mathematical Expectations
23UMACT06	**DIFFERENTIAL EQUATIONSANDITSAPPLICATIONS**	**CLO 1**	Determine solutions of homogeneous equations, non-homogeneous equations of degree one in two variables, solve Bernoulli's equations and exact differential equations
		CLO 2	Find the solutions of equations of first order but not of higher degree and to Determine particular integrals of algebraic, exponential, trigonometric functions and their products
		CLO 3	Find solutions of simultaneous linear differential equations, linear equations of second order and to

			find solutions using the method of variations of parameters
		CLO 4	Form a PDE by eliminating arbitrary constant and arbitrary functions, Find complete,singular and general integrals,to solve Lagrange'sequations
		CLO 5	Explain standard forms and Solve Differential equations using Charpit's method
23UMACT05	**VECTOR CALCULUS AND ITS APPLICATIONS**	**CLO1**	Find the derivative of vector and sum of vectors, product of scalar and vector point function and to Determine derivatives of scalar and vector products
		CLO2	Find the derivative of vector and sum of vectors, product of scalar and vector point function and to Determine derivatives of scalar and vector products
		CLO3	Solve simple line integrals
		CLO4	Solve surface integrals and volume integrals
		CLO5	Verify the theorems of Gauss, Stoke's and Green's (TwoDimension)
23UMACT09	**ABSTRACT ALGEBRA**	**CLO1**	Explain groups, subgroups and cyclic groups
		CLO2	Explain about Normal sub group, Quotient groups,Homomorphisms and Automorphisms and verify the functions for homomorphism and automorphism properties
		CLO3	Explain Permutation groups and apply Cayley's theorem to problems
		CLO4	Explain Rings, Ideals and Quotient Rings and examine their structure
		CLO5	Discuss about the field of quotient of an integral domain and to Explain in detail about Euclidean Rings
23UMACT10	**REAL ANALYSIS**	**CLO1**	Explain the concepts of Continuous and Discontinuous functions, open and close sets, Connectedness, Completeness and Compactness
		CLO2	Explain the concepts of bounded and totally bounded sets ,continuity of inverse functions and Uniform continuity
		CLO3	Define the sets of measure zero,to Explain about the existence and properties of Riemann integral
		CLO4	Explain the concept of differentiability and to

			Explain Rolle's theorem, Law of mean, and Fundamental theorem of calculus
		CLO5	Explain the point wise and uniform convergence of sequence of function and to derive the Taylor's theorem
21UMACT11	**MATHEMATICAL MODELLING**	**CLO1**	Explain simple situations requiring Mathematical Modelling and to Determine the characteristics of such models
		CLO2	Model using differential equations in-terms of linear growth and Decay models
		CLO3	Model using systems of ordinary differential equations of first order, to discuss about various models under the categories 'Epidemics' and 'Medicine'
		CLO4	Explain in detail about difference equations
		CLO5	Model using difference equations
23UMACT12	**OPTIMIZATION TECHNIQUES**	**CLO1**	Define linear programming problem and to solve the problems using graphical method, Simplex method and Big-M method.
		CLO2	Solve Transportation problems and Assignment problems
		CLO3	Find solutions for sequencing problems.
		CLO4	Discuss game,strategies on dominance property
		CLO5	Construct network and do PERT calculations
23UMACT13	**LINEAR ALGEBRA**	**CLO1**	Acquire a detailed knowledge about vector spaces and subspaces
		CLO2	Explain the concepts of Linear Dependence ,Linear Independence, Bases and Dimension of basis
		CLO3	Explain the concept of Linear Transformations, their Matrix representation and the notion of dual spaces
		CLO4	Find the Eigen values and Eigen vectors, to apply the concepts for diagonalisation
		CLO5	Explain about Inner product and norms and to apply Gram Schmidt Orthogonalization Process to problems on inner product spaces
23UMACT14	**COMPLEX ANALYSIS**	**CLO1**	Explain about analytic functions, their differentiation and continuity and to verify the Harmonic functions using analyticity

			conditions
		CLO2	Explain the concept of Conformal mappings and mappings by linear transformations and linear fractional transformations
		CLO3	Explainabouttheintegrationsoffunctionsoversimplyandmultiplyconnecteddomains and to derive the Cauchy integral formula, Liouvlle's theorem, Fundamental theorem of Algebra and Maximum Module Principle
		CLO4	Find the convergence the sequences and series, to derive Taylor's and Laurent's series
		CLO5	Find the nature of singularities, to find the residue of a given function singular point, to Explain about zeros and poles and to evaluate real improper integrals (Excluding poles on the real axis)
23UMACT15	**MECHANICS**	**CLO1**	Define Resultant, Component of aForce, Coplanar forces, like and unlike parallel forces, Equilibrium of a Particle, Limiting equilibrium of a particle on an inclined plane
		CLO2	Define Moment of a force and Couple with examples. Define Parallel Forces and Forces acting along a Triangle, Solve problems on frictional forces
		CLO3	Define work, energy, power, rectilinear motions under varying forces. Define Simple Harmonic Motion and find its Geometrical representation
		CLO4	Define Projectile, impulse, impact and laws of impact. Prove that the path of a projectile is a parabola. Find the direct and oblique impact of smooth elastic spheres
		CLO5	Define central orbits,explain conic as centered orbits and solve problems related to central orbits
23UMAME02	**NUMBER THEORY**	**CLO1**	DescribeEuclid'sAlgorithm,Greatest Common Divisor via Euclid'sAlgorithm.
		CLO2	To discuss The Fundamental Theorem of arithmetic.
		CLO3	To describe Euclid'sAlgorithm,Greatest Common Divisor viaEuclid's Algorithm
		CLO4	Discuss Linear Diophantine Equations and the Chinese Remainder Theorem.
		CLO5	Discuss Euler'sTheorem, An application of algebra.
23UMAME01	**NUMERICAL**	**CLO1**	Find the roots of a polynomial equation. Find

	METHODS WITH APPLICATIONS		one of the most commonly used techniques for finding the roots of given equations
		CLO2	Define for solving differential equations by approximating derivatives with finite differences.To solve the problems using forward and backward formulaes.
		CLO3	To determine the functions values even when the parameters are not evenly spaces. Inthis chapter is used to calculate the values of the independent variable X that corresponds to a given function values.
		CLO4	To find involves the computation of a derivative of a function f from given values of f. To find how to use the Simphson 1/3 and 3/8formulae for solving the problems.
		CLO5	To find techniques that attempt to find the exact or approximation solutions of nonlinear systems by applying a finite number of operations,such as matrix factorization, elimination, or inversion
23UMAME03	**MATHEMATICAL STATISTICS**	**CLO1**	Define Random variables,Probability mass function,Probability density function,and Distribution functions.
		CLO2	Compute Expectation,Variance and Covariance.
		CLO3	Know about Moment Generating functions and Characteristic functions.
		CLO4	Solve problems involving the concepts of theoretical Discrete distributions.
		CLO5	Solve problems involving the concepts of theoretical continuous distributions.
23UMAME05	**DISCRETE MATHEMATICS**	**CLO1**	To find mathematical logic statement and notations.
		CLO2	To find the decision problem of finding whether a given statement is tatutology or contradiction or satisfiable in a finite number of steps.
		CLO3	To find the predicate logic.To find the theory of inference for the Predicate calculus.
		CLO4	Define Relations and Ordering. Define types of functions and natural numbers.
		CLO5	Define Definition and properties of Lattice. To solve Boolean Algebra
23UMAME06	**GRAPH THEORY WITH**	**CLO1**	Understand the concepts of Graph, Subgraph, Walks and Paths

	APPLICATIONS	CLO2	Discuss about Eulerian graphs, Hamiltonian Paths and Trees.
		CLO3	Give Matrix Representations of Graphs
		CLO4	Know about Chromatic number and Chromatic Polynomial
		CLO5	Describe about digraph, Euler digraphs
23UMAAT01	ALLIED MATHEMATICS -I:ALGEBRA AND CALCULUS	CLO1	Explain in detail about Imaginary roots, irrational roots and formation of equations and Descarte's rule of sign.
		CLO2	Explain Characteristic equation and roots of the matrix and Eigen values and Eigen vector of the matrix and Verification of Cayley Hamilton theorem
		CLO3	Explain Formula for Radius of curvature in Cartesian co ordinates and Parametric coordinates and Polar coordinates
		CLO4	Explain Formation of Partial Differential Equations by eliminating the arbitrary constant and arbitrary functions
		CLO5	Explain Simple properties of definite Integrals and Bernoulli's Formula and Integration by parts.
23UMAAP01	ALLIED MATHEMATICS –PRACTICAL	CLO1	Explain in detail about Rank of Matrix and Characteristics equation of a Matrix and Cayley Hamilton Theorem and Problems to verify Cayley Hamilton
		CLO2	Explain Leibnitz formula forn^{th} derivative
		CLO3	Explain Euler's theorem on homogeneous function and Problems to verify Euler's Theorem and Partial derivative.
		CLO4	Explain Scalar and Vector point functions and Gradient of scalar point functions.
		CLO5	Explain Divergence and Curl of vector point functions and Solinoidal vector and Irrotational vector
23UMAEGS01	DISCRETE MATHEMATICS-I	CLO1	Define Mathematical Logics and few examples
		CLO2	Define Normal Forms and The theory of inference for the statement calculus
		CLO3	Describe The Predicate Calculus and Inference theory of the predicate calculus
		CLO4	Describe The Predicate Calculus and Inference theory of the predicate calculus
		CLO5	Describe Relation and ordering and Functions
23UMAEGS02	DISCRETE MATHEMATICS-II	CLO1	Define Algebraic system-definitions and examples.
		CLO2	Define Groups and the application of the

			residue arithmetic to computers
		CLO3	Define Latex and Boolean algebra and problems
		CLO4	Define Boolean functions and examples
		CLO5	Define graph theory and some basic definitions
23UMASE04	STATISTICS WITH EXCEL PROGRAMMIN G	CLO1	Handle distribution of data and analyses the characteristics of data using Excel.
		CLO2	To find Normal distribution,common distribution shapes, Correlation Coefficient and plot graphs using Excel
		CLO3	Create Time-Series Graphs,Dot plots, Stem plots, Bar Charts,Pie Charts using Excel
		CLO4	Compute Mean and Median using Excel.
		CLO5	Compute Mode, Midrange, Weighted Mean using Excel
23UMASE07	LaTeX-PRACTICAL	CLO1	Make different Alignments in a document and an Application for a job
		CLO2	Generate Bio-Data and Table Structures
		CLO3	Create Mathematical Statements using LaTeX
		CLO4	Prepare Article sand Inserting Pictures.
		CLO5	Prepare Question paper and Power Point presentation in LaTeX format
23UMAPC01	STATISTICS WITH R PROGRAMMING	CLO1	Understand the usage of R Software and able to handle basic data types of R.
		CLO2	Create data, find the missing values, converting data types
		CLO3	Apply the control structures, numerical and statistical functions
		CLO4	To import files, able to connect with a database and handle Pie and Bar Charts
		CLO5	Compute mean , median, mode and skewness using R.
23UMAAT02	ALLIED MATHEMATICS-II:DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	CLO1	Explain Jacobian of two variables and three variables and Maxima and Minima functions of two variables.
		CLO2	Explain Finite difference and Higher differences and

			Construction of difference table and Newton's Forward Backward difference formula and Lagrange's Interpolation formula
		CLO3	Explain Second Order Differential Equation with constant coefficients and Particular Integral
		CLO4	Explain definition of Laplace Transforms and standard formula and linearity property and shifting property and Change of Scale property and Laplace Transforms of derivatives
		CLO5	Explain standard formula and elementary theorems and Applications to solutionsof second order differential equations with constant coefficients.

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