PROGRAMME OUTCOMES
PROGRAMME SPECIFIC OUTCOMES
COURSE OUTCOMES

B.Sc Mathematics

UNDER GRADUATE PROGRAM OUTCOMES:

At the end of Under Graduate Program at St. Thomas College (Autonomous), a student will have obtained:

PO1	Critical Thinking: Ability to take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives
PO2	Effective Communication: Ability to speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology
PO3	Effective Citizenship: Ability to demonstrate empathetic social concern and equity-centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering
PO4	Environment and Sustainability: Ability to understand the issues of environmental contexts and sustainable development
PO5	Ethical Living: Ability to recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them
PO6	Social Interaction: Ability to elicit views of others, mediate disagreements and help reach conclusions in group settings
PO7	Problem Solving and Analytical Skills: Ability to think rationally, analyze situations and solve problems adequately

Program Specific Outcomes:

At the end of B.Sc Mathematics at St. Thomas College (Autonomous), Thrissur, a student will have developed:

PSO1	Understand the basic concepts and tools of Mathematical logic, methods of proofs, set theory, Number theory, abstract structures and algebra.
PSO2	Acquire knowledge in Calculus & Geometry.
PSO3	Apply mathematical theories and principles accurately, precisely and effectively.
PSO4	Analyze and solve real world problems applying mathematical models.

Course Outcomes:

B.Sc. Mathematics

MTS1 B01 BASIC LOGIC & NUMBER THEORY

At the end of this course, a student will have developed ability to:

CO1	Model problems in mathematics using logic.
CO2	Analyse results involving divisibility, GCD and LCM.
CO3	Understand methods of solving LDE.
CO4	Analyse the theory of congruence.
CO5	Solve congruences using Fermat's Theorem, Wilson's Theorem and Euler's Theorem.
CO6	Understand the concept of number theoretic functions.

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MTS2 B02 CALCULUS OF SINGLE VARIABLE-1

At the end of this course, a student will have developed ability to:

CO1	Define limit, continuity and differentiability.
CO2	Explain basic theoremsofdifferentialcalculus.
CO3	Apply the concepts and theorems in calculus to draw the graph of a function.
CO4	Define anti derivatives and area under the graph of a function.
CO5	Understand basic theoremsof integral calculus.
CO6	Apply the concept of definite integral to find the area between two curves, volume and arc length.

B.Sc. Mathematics

MTS3 B03 CALCULUS OF SINGLE VARIABLE-2

At the end of this course, a student will have developed ability to:

CO1	Explain logarithmic function, exponential function, trigonometric function and hyperbolic function.
CO2	Apply L'Hopital Rule to solve indeterminate forms.
CO3	Illustrate convergence and divergence in sequences and series.
CO4	Illustrate Taylor and Maclaurin series .
CO5	Explain the calculus of parametric equations.
CO6	Understand differentiation and integration of vector valued functions.

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MTS4 B04 LINEAR ALGEBRA

At the end of this course, a student will have developed ability to:

CO1	Solve system of linear equations using various methods.
CO2	Illustrate vector space, sub space, linear independence, linear dependence and basis.
CO3	Understand dimension theorem for matrices.
CO4	Explain basic matrix transformations.
CO5	Demonstrate diagonalization.
CO6	Apply Gram-schmidt orthonormalization process.

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MTS5B05THEORYOFEQUATIONSANDABSTRACTALGEBRA

At the end of this course, a student will have developed ability to:

CO1	Understand division of polynomials, remainder theorem, Taylor's formula and limits of roots.
CO2	Solve polynomial equations.
CO3	Illustrate groups and sub groups.
CO4	Demonstrate isomorphism and homomorphism of groups.
CO5	Illustrate commutative rings.

B.Sc. Mathematics

MTS5 B06 BASIC ANALYSIS

At the end of this course, a student will have developed ability to:

CO1	Understand various properties of $\mathbb{R}$.
CO2	Explain sequences of real numbers and related theorems.
CO3	Analyze basic topology on $\mathbb{R}$.
CO4	Understand complex numbers and complex functions.
CO5	Illustrate limit and continuity of complex valued functions.

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MTS5 B07 NUMERICAL ANALYSIS

At the end of this course, a student will have developed ability to:

CO1	Find out the approximate numerical solutions of algebraic and transcendental equations with desired accuracy using Bisection method, Fixed point iteration and Newton's method.
CO2	Explain interpolation and Lagrange polynomial.
CO3	Solve problems using Newton's forward difference, Newton'sbackward difference, centred differences and Stirling's formula.
CO4	Apply numerical differentiation and integration.
CO5	Solve ordinary differential equations using numerical methods.

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MTS5 B08 LINEAR PROGRAMMING

At the end of this course, a student will have developed ability to:

CO1	Solve linear programming problems geometrically.
CO2	Solve LP problems more effectively using Simplex algorithm.
CO3	Explain duality theory.
CO4	Illustrate game theory.
CO5	Solve transportation and assignment problems.

B.Sc. Mathematics

MTS5 B09 INTRODUCTION TO GEOMETRY

At the end of this course, a student will have developed ability to:

CO1	Understand basic facts about conics.
CO2	Classify conics.
CO3	Explain Kleinian view of Euclidean geometry.
CO4	Analyze affine transformations.
CO5	Understand the fundamental theorem of affine geometry.
CO6	Interpret various perspectives of projective geometry and projective transformations.

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MTS6 B10 REAL ANALYSIS

At the end of this course, a student will have developed ability to:

CO1	Understand fundamental properties of continuous functionson intervals.
CO2	Distinguish continuity and uniform continuity.
CO3	Develop the notion of Riemann integrability of a function using Riemann sums.
CO4	Understand basic and fundamental results of integration theory.
CO5	Illustrate convergence and divergence of sequences and series of functions.
CO6	Explain the notion of improper integrals and their convergence.

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MTS6 B11 COMPLEX ANALYSIS

At the end of this course, a student will have developed ability to:

CO1	Distinguish between differentiability and analyticity of complex functions.
CO2	Understand necessary and sufficient condition for checking analyticity.
CO3	Relate harmonic functions and analytic functions.
CO4	Analyze elementary complexfunctions.
CO5	Understand complex integral, its properties and evaluation.
CO6	Explain afewfundamentalresults oncontourintegration theory such as Cauchy's theorem, Cauchy-Goursat theorem and their applications.
CO7	Apply Cauchy's integral formula and derive Liouville's theorem, Morera's theorem and power series expansion of an analytic function.
CO8	Apply Residue theorem to evaluate contour integrals.

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MTS6 B12 CALCULUS OF MULTI VARIABLE

At the end of this course, a student will have developed ability to:

CO1	Understand multivariable functions and their representations.
CO2	Understand the idea of limit and continuityfor functions of several variables.
CO3	Apply the notion of partial derivatives to evaluate directional derivatives.
CO4	Find extreme values of a multivariable function using second derivative test and Lagrange multiplier method.
CO5	Applypolar,spherical and cylindrical coordinate systems intheevaluation of double and triple integrals .
CO6	Apply double and triple integral in the problem of finding out surface area ,mass of lamina, volume, centre of mass and soon.
CO7	Understand the notion of a vector field, the idea of curl and divergence of a vector field, their evaluation and interpretation.
CO8	Illustrate Green's theorem, Gauss's theoremand Stokes' theoremof multivariable calculus and their use in several areas and directions.

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MTS6 B13 DIFFERENTIAL EQUATIONS

At the end of this course, a student will have developed ability to:

CO1	Identify some areas where the modelling process results in a differential equation.
CO2	Solve linear, variable separable and exact DEs and analyse their solutions.
CO3	Distinguish between linear and non linear DEs and conditions for occurrence of their solutions.
CO4	Illustrate the theory and method for solving a second order linear homogeneous and nonhomogeneous equation with constant coefficients.
CO5	Find out a series solution for homogeneous equations with variable coefficients near ordinary points.
CO6	Solve differential equations using Laplace method.
CO7	Solve partial differential equations using the method of separation of Variables

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MTS6 B14 (E01) GRAPH THEORY

At the end of this course, a student will have developed ability to:

CO1	Define graphs, sub graphs and degrees.
CO2	Analyze properties of graphs.
CO3	Explain trees and their properties.
CO4	Distinguish between Eulerian and Hamiltonian graphs.
CO5	Illustrate planar graphs.

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MTS6 B14 (E02) TOPOLOGY OF METRIC SPACES

At the end of this course, a student will have developed ability to:

CO1	Illustrate metric spaces.
CO2	Explain various related terminologies.
CO3	Understand convergence for sequences.
CO4	Explain Continuity and connectedness in metric space.

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MTS6B14(E03) MATHEMATICAL PROGRAMMING WITH PYTHON AND LATEX

At the end of this course, a student will have developed ability to:

CO1	Understand basis of Python programming.
CO2	Apply Python programming in plotting mathematical functions.
CO3	Apply Python programming in numerical analysis.
CO4	Understand typesetting using Latex.
CO5	Apply Latex in writing equations.

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MTS5 D01 APPLIED CALCULUS

At the end of this course, a student will have developed ability to:

CO1	Illustrate functions, limit, continuity and differentiability.
CO2	Find derivatives of various functions.
CO3	Identify monotone functions.
CO4	Analyze concavity and points of inflection.
CO5	Define exponential and logarithmetic functions.
CO6	Explain integration and related theorems.

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MTS5D02DISCRETEMATHEMATICSFORBASICANDAPPLIEDSCIENCES

At the end of this course, a student will have developed ability to:

CO1	Explain ideas in precise and concise mathematical terms and also to make valid arguments using mathematical logic.
CO2	Define semi groups, groups, cyclic groups and permutation groups.
CO3	Define Boolean algebra and state its properties.
CO4	Explain Boolean functions and give examples.
CO5	Define graph and tree and give examples.
CO6	Explain planar graphs and Euler's formula.

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MTS5 D03 LINEAR MATHEMATICAL MODELS

At the end of this course, a student will have developed ability to:

CO1	Explain the basic concepts of linear functions.
CO2	Solve system of linear equations using various methods.
CO3	Solve linear programming problems geometrically.
CO4	Solve LP problems more effectively using Simplex algorithm.
CO5	Explain duality theory.

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MTS5 D04 MATHEMATICS FOR DECISION MAKING

At the end of this course, a student will have developed ability to:

CO1	Define data classification and experimental design.
CO2	Understand frequency distributions and their graphs.
CO3	Explain measures of central tendency.
CO4	Understand basic concepts of probability and counting
CO5	Explain discrete probability distributions.
CO6	Explain normal and standard normal distributions.

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MTS1 C01:MATHEMATICS-1

At the end of this course, a student will have developed ability to:

CO1	Define limit, continuity and differentiability.
CO2	Explain some basic theorems of differential calculus.
CO3	Apply the concepts and theorems in calculus to draw the graph of a function.
CO4	Illustrate L'hopital's rule.
CO5	Understand anti derivatives and area under the graph of a function.
CO6	Explain some basic theorems of integral calculus.
CO7	Apply the concept of definite integral to find the area between two curves and volume.

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MTS2 C02:MATHEMATICS-2

At the end of this course, a student will have developed ability to:

CO1	Relate points in polar coordinates.
CO2	Understand parametric curves.
CO3	Find length and area in polar coordinates.
CO4	Illustrate numerical integration.
CO5	Analysis convergence and divergence in series.
CO6	Explain Taylor and Maclaurin series.
CO7	Explain vector space, sub space, linear independence, linear dependence and basis.
CO8	Illustrate row space, column space null space and diagonalization.

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MTS3 C03:MATHEMATICS-3

At the end of this course, a student will have developed ability to:

CO1	Explain vector valued functions, limit, continuity and derivatives.
CO2	Illustrate the idea ofdirectional derivative, its evaluation, interpretation, and relationship with partial derivatives.
CO3	Understand the notion of a vector field, the idea of curl and divergence of a vector field, their evaluation and interpretation.
CO4	Apply double in the problem of finding out mass of lamina, centre of mass, moment of inertia and so on.
CO5	Illustrate Green's theorem of multivariable calculus and its their use in several areas and directions.
CO6	Apply the advantage of choosing other coordinate systems such as polar, spherical, cylindrical etc. in the evaluation of triple integrals.
CO7	Distinguish between differentiability and analyticity of a complex function.
CO8	Apply Cauchy-Goursat Theorem and Cauchy's Integral formula to evaluate contour integrals.

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MTS4 C04:MATHEMATICS-4

At the end of this course, a student will have developed ability to:

CO1	Identify a number of areas where the modelling process results in a differential equation.
CO2	Solve DEs that are in linear, separable and in exact forms.
CO3	Illustrate the theory and method of solving a second order linear homogeneous and non homogeneous equation with constant coefficients.
CO4	Understand Laplace transform and Fourier series.
CO5	Solve PDE using variable separable method.