



ST. THOMAS COLLEGE OF ARTS AND SCIENCE

Affiliated to the University of Madras | An ISO 9001:2015 Certified Institution

Koyambedu, Chennai- 107



DEPARTMENT OF MATHEMATICS

PROGRAMME NAME | **BACHELOR OF MATHEMATICS**

PROGRAMME OUTCOMES

The overall aim of B.Sc. Mathematics is to

PO1: develop broad and balanced knowledge and understanding of definitions, concepts, principles and theorems.

PO2: enhance the ability of learners to apply the knowledge and skills acquired by them during the programme to solve specific theoretical and applied problems in mathematics.

PO3: provide students/learners sufficient knowledge and skills enabling them to undertake further studies in mathematics and its allied areas on multiple disciplines concerned with mathematics.

SEMESTER – I

SUBJECT CODE: SM21A

SUBJECT NAME: ALGEBRA

CO1	Basic ideas on Theory of Equations, Matrices and Theory of Numbers
CO2	Knowledge to solve theoretical and applied problems
CO3	To learn divisibility of integers and congruence relations
CO4	To learn eigen values and eigen vectors of matrix
CO5	To develop fluency in working with linear equations

SUBJECT CODE: SM21B

SUBJECT NAME: DIFFERENTIAL CALCULUS

CO1	Organize, manage, present and analyze the successive differentiation and total differential
CO2	Analyze uses and applications of calculus
CO3	To analyze the concepts of total differential of a function, maxima, minima of functions



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SUBJECT CODE: SM3AB SUBJECT NAME: CALCULUS OF FINITE DIFFERENCES AND NUMERICAL ANALYSIS - I

CO1	Knowledge about the concept of interpolation
CO2	Knowledge about interpolation for unequal intervals divided difference method
CO3	Knowledge about the concept of the Lagrange's interpolation and Gauss forward and backward method
CO4	Knowledge about the concept of the E operator and relation between them
CO5	Knowledge about the concept of Regula Falsi Method, Gauss Seidel Method

SEMESTER – II

SUBJECT CODE: SM22A SUBJECT NAME: TRIGONOMETRY

CO1	Knowledge about the expansion of trigonometric functions
CO2	Knowledge about the expansion of hyperbolic functions
CO3	Knowledge about Gregory's series
CO4	Solve trigonometric equations
CO5	Demonstrate knowledge of several trigonometric identities and use them to verify other identities

SUBJECT CODE: SM22B SUBJECT NAME: INTEGRAL CALCULUS AND VECTOR ANALYSIS

CO1	Integration and its geometrical applications, double, triple integrals and improper integral
CO2	Beta and gamma functions, recurrence functions
CO3	Vector differentiation and Vector integration
CO4	Directional derivative, Gradient, divergence, curl, Laplacian differential operator
CO5	Line, surface, volume integrals, integral theorems – Gauss, Greens, Stokes

SUBJECT CODE: SM3AF SUBJECT NAME: CALCULUS OF FINITE DIFFERENCES AND NUMERICAL ANALYSIS - II

CO1	To acquire knowledge about numerical differentiation
CO2	To acquire knowledge about numerical integration
CO3	To know difference equations
CO4	To obtain knowledge of numerical solutions of ordinary differential equations
CO5	To obtain knowledge of numerical solutions of ordinary differential equations



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SEMESTER – III

SUBJECT CODE: SM23A

SUBJECT NAME: ANALYTICAL GEOMETRY

CO1	To analyze characteristics and properties of two- and three-dimensional geometric shapes
CO2	To find equation in various form of line, circle, ellipse, hyperbola, sphere
CO3	To find equation of straight line, circle, conic – equation of chord, tangent, normal. Equations of the asymptotes of a hyperbola
CO4	To find the length of the perpendicular, angle between a line and a plane, coplanar lines, shortest distance
CO5	To find the equation of a sphere, section of a sphere by a plane, angle of intersection of two spheres, condition for the orthogonality

SUBJECT CODE: SM23B

SUBJECT NAME: DIFFERENTIAL EQUATIONS

CO1	Students will understand the concepts of existence and uniqueness of solutions
CO2	Students will be able to find the complete solutions of a differential equation with constant coefficients by variation of parameters
CO3	Student will be able to solve first order differential equations utilizing the standard techniques for separable, exact, linear, homogenous, Bernoulli cases

SUBJECT CODE: SM3AC STATISTICS - I

SUBJECT NAME: MATHEMATICAL

CO1	Introduction to probability density function and probability distribution function
CO2	Derivation of mathematical expectation for discrete and continuous distribution
CO3	Derivation moment generating function for discrete and continuous distribution
CO4	To understand the concept of uniqueness, inversion theorem, Chebyshev's inequality
CO5	To find the inter relation between two or more phenomena with the help of correlation and regression analysis



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SEMESTER – IV

SUBJECT CODE: SM24A

SUBJECT NAME: TRANSFORM TECHNIQUES

CO1	Students will be able to know the use Laplace transform in system modelling, solving boundary value problems
CO2	To apply Fourier series methods to solve boundary value problem for linear ODE's
CO3	To enable students to use Fourier series methods both in the solution of partial differential equations and in other wider contexts

SUBJECT CODE: SM24A

SUBJECT NAME: STATICS

CO1	Able to analyze force systems in plane and also in space.
CO2	Able to solve two and three dimensional rigid body static equilibrium problems.
CO3	To learn general motion of a rigid body, equivalent systems of forces, parallel forces and forces along the sides of a triangle couples
CO4	Able to determine the centroid of planes, center of gravity of masses
CO5	Discuss the equilibrium of a uniform cable hanging freely under its own weight.

SUBJECT CODE: SM3AG
STATISTICS - II

SUBJECT NAME: MATHEMATICAL

CO1	Solving problems based on large and small samples
CO2	To compute the analysis of variance- one way and two way classifications
CO3	To determine the properties of point estimators
CO4	Knowledge on Neyman-Pearson lemma, construct likelihood ratio test
CO5	Knowledge on sampling distribution

SUBJECT CODE: ENV4B

SUBJECT NAME: ENVIRONMENTAL STUDIES

CO1	To know about environmental policies and practices
CO2	Human communities and the environment
CO3	Environmental ethics
CO4	Environmental communications
CO5	To obtain the experience of Field work



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SEMESTER – V

SUBJECT CODE: SM25A SUBJECT NAME: ALGEBRAIC STRUCTURES – I

CO1	To acquire knowledge on Group and Ring Theory
CO2	Introduction to ideals and concepts related to ideals
CO3	To find cycles and transposition of a given permutation
CO4	To prove Lagrange Euler Fermat theorem
CO5	To prove Cayley's theorem, Fundamental theorem of homomorphism of groups

SUBJECT CODE: SM25B SUBJECT NAME: REAL ANALYSIS - I

CO1	Recognize the sets, functions and mappings
CO2	Recognize the sequence and series of real numbers
CO3	Recognize the convergence and divergence of real numbers
CO4	Recognize the continuity of real numbers
CO5	Recognize the metric spaces

SUBJECT CODE: SM25C SUBJECT NAME: DYNAMICS

CO1	Knowledge to Distinguish kinematic and kinetic motion
CO2	Knowledge on basic relations between distance, time, velocity and acceleration
CO3	Apply vector mechanics as a tool for solving kinematic problems
CO4	Create a Schematic drawing of a real world mechanism
CO5	To determine degree of freedom of mechanism

SUBJECT CODE: SM25D SUBJECT NAME: DISCRETE MATHEMATICS

CO1	Students will be able to understand the basic concepts of sets and its applications
CO2	Analyze logical positions via truth table
CO3	Prove mathematical theorem using mathematical induction
CO4	Boolean algebra became an essential tool for the analysis and design of electronic computers, dial telephone switching systems and many kind of electronic control devices
CO5	Solve counting problems involving the multiplication rule, permutations and combinations

SUBJECT CODE: SM45D SUBJECT NAME: NUMERICAL METHODS

CO1	Numerical techniques used as powerful tools in scientific computing
CO2	Linear, Algebraic and Transcendental equations and interpolation using finite difference formulae
CO3	Numerical Differentiation , Numerical Integration and difference equations



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SUBJECT CODE: VAE5Q

SUBJECT NAME: VALUE EDUCATION

CO1	To learn about philosophy of Life and Individual qualities.
CO2	To learn and practice social values and responsibilities.
CO3	To learn more about interdependence of all beings.
CO4	To learn more on Social Evils
CO5	To understand the importance of value based living

SUBJECT CODE: SM3CA/SM3AG

SUBJECT NAME: PRACTICAL -

MATHEMATICAL STATISTICS I & II

CO1	Knowledge on Measures of location, dispersion, skewness and kurtosis
CO2	Knowledge on curve fitting using methods of least squares
CO3	Knowledge on correlation and regression analysis
CO4	Knowledge on test of hypothesis
CO5	Knowledge on test of independence of attributes based on contingency table

SEMESTER – VI

SUBJECT CODE: SM26A

SUBJECT NAME: ALGEBRAIC STRUCTURES - II

CO1	To learn the concept of linear transformation
CO2	To learn inner product spaces and Gram-Schmidt process of orthogonalization
CO3	Introduction to Vector Spaces and Subspaces
CO4	To acquire knowledge on basis and dimension of vector space
CO5	To learn the importance of linear Transformations and its canonical forms

SUBJECT CODE: SM26B

SUBJECT NAME: REAL ANALYSIS – II

CO1	Recognize the concepts of open, closed and metric spaces
CO2	Recognize the concepts of Riemann integral and calculus
CO3	Recognize the concepts of derivatives and Taylor's series
CO4	Recognize the concepts of sequence and series of functions
CO5	Recognize the concepts of point wise and uniform convergence

SUBJECT CODE: SM26C

SUBJECT NAME: COMPLEX ANALYSIS

CO1	Represent complex numbers algebraically and geometrically
CO2	Analyze limit, continuity and differentiation of functions of complex variables.
CO3	Understand Cauchy-Riemann equations, analytic functions and various properties of analytic functions
CO4	Understand conformal mappings
CO5	Understand Cauchy theorem and Cauchy integrals formula and apply these to evaluate complex contour integrals



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SUBJECT CODE: SM4AG

SUBJECT NAME: GRAPH THEORY

CO1	Model real world problems using graph theory
CO2	Students will be able to formally understand and prove theorems/lemmas and relevant results in graph theory
CO3	Design and evaluate Euler and Hamilton circuits

SUBJECT CODE: SM4AH

SUBJECT NAME: OPERATIONS RESEARCH

CO1	Solving linear programming problem
CO2	Sequencing the jobs to be carried out based on cost optimization
CO3	Solving assignment and transportation problems and Queuing theory
CO4	Model competitive real-world phenomena using concepts from game theory. Analyze pure and mixed strategy games.
CO5	Formulate network model for service and manufacturing systems and apply operations research techniques and algorithms to solve these network problems