Department of Mathematics

B. Sc. (Mathematics)

The mission of the mathematics degree programs is to equip students with analytic and problem solving skills for careers and graduate work. Classes develop student abilities and aptitudes to apply mathematical methods and ideas not only to problems in mathematics and related fields such as the sciences, computer science, actuarial science, or statistics, but also to virtually any area of inquiry. Students learn to communicate ideas effectively and to digest new information and concepts independently. Students are encouraged to develop intellectually and to become involved with professional organizations. The department cooperates fully in meeting its mission for candidates for B.Sc. degree in mathematics.

Programme Outcome:	• Demonstrate skills in algebra, analysis, calculus and applied mathematics. • Apply the underlying unifying structures of mathematics (i.e. sets, relations and functions, logical structure) and the relationships among them through algebraic and analytic view. • Demonstrate proficiency in writing proofs. • Communicate mathematical ideas both orally and in writing. • Investigate and apply mathematical problems and solutions in a variety of contexts related to science, technology, business and industry, and illustrate these solutions using symbolic, numeric, or graphical methods. • Investigate and solve unfamiliar math problems.
Programme Specific Outcome:	• Think in a critical manner. • Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand. • Formulate and develop mathematical arguments in a logical manner. • Acquire good knowledge and understanding in advanced areas of mathematics and statistics, chosen by the student from the given courses.

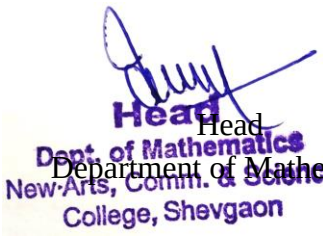
Course Outcome	
FYBSc (Sem I & II) CBCS	
MT111 Algebra	On completion of this course students will be expected to: • Prove results involving divisibility and greatest common divisors; • Applications of Modular Arithmetic's. • Find integral solutions to specified linear Diophantine Equations; • Apply Euler-Fermat's Theorem to prove relations involving prime numbers; • Polynomial addition, subtraction, division, multiplication, roots of polynomials. Transformation, translation and reflection; • Understand the complex numbers, algebra of complex numbers, roots of complex numbers, regions in complex plane
MT112 Calculus I	On completion of this course students will be expected to: • Be able to solve algebraic equations and inequalities involving the square root and modulus function understand the difference between equations and identities, and be able to prove simple identities and inequalities. • Be able to recognize odd, even, periodic, increasing, decreasing functions. • Understand the operation of composition of functions. • Be able to calculate limits by substitution and by eliminating zero denominators. • Be able to calculate limits at infinity of rational functions.

MT113 Mathematics Practical	• Problem solving on algebra and calculus-I manually and also using maxima software.
MT121 Analytic Geometry	On completion of this course students will be expected to: • Used cut-out shapes as a means to develop the mental transformation of geometric shapes. • Perform translations and rotations of the coordinate axes to eliminate certain terms from equations. • To find nature of general conics. • Finding equation in various form of line, circle, ellipse, sphere, cones etc.
MT122 Calculus II	On completion of this course students will be expected to: • Calculate limits in indeterminate forms by a repeated use of L'Hopital's rule. • Use derivatives to find intervals on which given function is increasing or decreasing. • Geometrical representation and problem solving on MVT and Rolls theorem. • Find maxima and minima, critical points and inflection points of functions and to determine the concavity of curves. • To study integration of rational & irrational functions. • Introduction to Ordinary Differential Equation of first order – first degree and first order – higher degree.
MT123 Mathematics Practical	• Problem solving on analytic geometry and calculus-II manually and also using maxima software.
SYBSc (Sem III & IV)	
MT-231: Calculus of Several Variables	On successfully completion of Multivariable Calculus the student will be able to: • Identify various quadric surfaces through their equations. • Sketch various types of surfaces. • Define vector functions of one real variable and sketch space curves. • Compute derivatives and integrals of vector functions. • Find the arc lengths and curvatures of space curves. • Find the velocity and acceleration of a particle moving along a space curve. • Define functions of several variables and their limits. • Calculate the partial derivatives of functions of several variables. • Apply the chain rule for functions of several variables. • Calculate the gradients and directional derivatives of functions of several variables. • Determine the extrema of functions of several variables. • Use the Lagrange multiplier method to find extrema of functions with constraints. • Study of double, triple integration with cartesian, polar, spherical coordinates by changing the variables.
MT-232(A): Numerical Methods and Its Applications	On completion of this unit successfully students will: • Able to understand the Solutions of Algebraic and Transcendental Equations. • Able to use the Newton's Interpolation Formulae (Forward and Backward). • Able to understand Numerical Differentiation and Integration. • Understand the concept of Numerical solution of first order ordinary differential equations by using various methods.
MT-233: Practical	• Problem solving on Calculus of Several Variables and Numerical Methods and Its Applications. Students are able to use the Maxima Software to deal with the problems.

MT-241:Linear Algebra	On successfully completion of this course unit students will be able to: • Understand the basic ideas of vector algebra: linear dependence and independence and spanning; • Know how to find the row space, column space and null space of a matrix, and be familiar with the concepts of dimension of a subspace and the rank and nullity of a matrix, and to understand the relationship of these concepts to associated systems of linear equations; • Be familiar with the notion of a linear transformation and its matrix; • Find the Gram-Schmidt orthogonalization of a matrix.
MT-242(A): Vector Calculus	On completion of this unit successfully students will be able: • How to deals with vector valued functions. • To understand topics like line integral ,surface integral which generalize integration to functions defined on curves & surfaces. • Understanding the computation of work done, flux, mass, area of the surfaces. • Understand the Greens theorem , Stokes theorem, Divergence theorem that teaches the relation between integration of functions over surfaces & boundry, solids & surface.
MT-243: Practical	• Problem solving on Linear Algebra and Vector Calculus. Students are able to use the Maxima Software to deal with the problems.
TYBSc (Sem III & IV)	
MT331 Metric Spaces	On completion of this unit successfullyly students will be able to: • Deal with various examples of metric spaces; • Have some familiarity with continuous maps; • Work with compact sets in Euclidean space; • Work with completeness; • Apply the ideas of metric spaces to other areas of mathematics.
MT332 Real Analysis I	• By the end of the course, students will be able to: • Explain the completeness of a system of real numbers: a least upper bound, a greatest lower bound. • Elaborate on the topological concepts of the real numbers: open sets, closed sets, accumulation points, closure, open covers, compact sets. • Define and utilize the following concepts: sequence, subsequence, monotone sequence, Cauchy sequence. • Prove that a given function is continuous or discontinuous and classify its points of discontinuity. • Justify the convergence/divergence of a given number series; • Prove some of the classical theorems of real analysis.
MT333 Problem Course	• Problem Course on Metric Spaces and Real Analysis I.
MT334 Group Theory	On completion of this unit successfully students will be able to: • Demonstrate when a binary algebraic structure forms a group. • Construct Caley tables. • Determine possible subgroups of a group. • Identify normal subgroups of a group. • Examine symmetric and permutation groups. • Explain group and subgroup orders using Lagrange's theorem. • Identify cyclic subgroups and their generators. • Identify factor group.

	• Implement group axioms. • Apply a range of mathematical techniques to solve a variety of quantitative problems. • Define homomorphism, kernel of a homomorphism, isomorphism. • Prove Cayley's theorem, the fundamental theorem of homomorphism for groups.
MT335 Ordinary Differential Equations	On completion of this unit successfully students will be able to: • Distinguish between linear, nonlinear, partial and ordinary differential equations. • State the basic existence theorem for 1st order ODE's and use the theorem to determine a solution interval. • Recognize and solve a variable separable differential equation. • Recognize and solve a homogeneous differential equation. • Recognize and solve an exact differential equation. • Recognize and solve a linear differential equation by use of an integrating factor. • Make a change of variables to reduce a differential equation to a known form. • Find particular solutions to initial value problems. • Solve basic application problems described by first order differential equations.
MT336 Problem Course	• Problem Course on Group Theory and Ordinary Differential Equations.
MT337(A) Operations Research	On completion of this unit successfully students will be able to: • Learn Modeling of Linear Programming, its graphical solution & the applications; • Understand The Simplex Method • Deal with the dual problems and Transportation Model • The Assignment Model for The Hungarian method and Simplex explanation of the Hungarian method
MT337(F) Number Theory	On completion of this unit successfully students will be able to: • Define and interpret the concepts of divisibility, congruence, greatest common divisor, prime, and prime-factorization. • Apply the Law of Quadratic Reciprocity and other methods to classify numbers as primitive roots, quadratic residues, and quadratic non residues. • Formulate and prove conjectures about numeric patterns. • Produce rigorous arguments (proofs) centered on number theory, most notably in use of Mathematical Induction or the Well Ordering Principal in the proof of theorems.
MT338 Practical	• Practical based on Lattice Theory and Number Theory. • Understand the definitions of lattice, sublattice, product and homomorphism, modular and distributive lattice • Understand the definitions of congruence, residue classes and least residues add and subtract integers, modulo n, multiply integers and calculate powers, modulo n. • Application based on Diophantine, Chinese remainder theorem .
MT341 Complex Analysis	Upon successfully completion Complex Analysis, a student will be able to: • Represent complex numbers algebraically and geometrically, • Define & analyze limit-continuity for complex functions & consequence of continuity, • Apply the concept & consequences of analyticity and the Cauchy Riemann equations & results on harmonic & entire functions including fundamental theorem of algebra, • Analyze sequences and series of analytic functions and types of convergence, • Evaluate complex contour integrals directly and by the fundamental theorem,

	• Apply the Cauchy integral theorem in its various versions, and the Cauchy integral formula, and Represent functions as Taylor, power and Laurent series, • Classify singularities and poles, • Find residues and evaluate complex integrals using the residue theorem.
MT342 Real Analysis II	Upon successfully completion of this course, students will be able to: • Define Riemann integrable and Riemann sums. • Prove a theorem about Riemann sums and Riemann integrals. • Knowledge of some simple techniques for testing the convergence of sequences and series of functions, and confidence in applying them.
MT343 Problem Course	• Problem Course on Complex Analysis and Real Analysis II
MT344 Ring Theory	Upon successfully completion of this course, students will be able to: • Write precise and accurate mathematical objects in ring theory. • For checking the irreducibility of higher degree polynomials over rings. • Understand the concepts like ideals and quotient rings. • Understand the concept of ring homomorphism.
MT345 Partial Differential Equations	Upon successfully completion of this course, students will be able to: • Explain the concepts and language of partial differential equations. • Understand the difference between ordinary & partial differential equation. • Classify the partial differential equations. • Solve the partial differential equation using charpits method, Jacobis method.
MT346 Problem Course	• Problem Course on Ring Theory and Partial Differential Equations
MT347(E) Lebesgue Integration	Upon successfully completion of this course, students will be able to: • Understand the measurable sets and properties of measurable sets; • Understand definition and examples of lebesgue integrals for bounded functions; • Lebesgue integrals for unbounded functions; • Understand definition and examples of Fourier series.
MT347(F) Computational Geometry	Students will able to understand: • Two & three dimensional transformations. • To get acquainted with typical problem on CG and existence solution. • Introduction to projection and its types. • Bezier curves.
MT348 Practical	• Practical based on Lebesgue integration and Computational Geometry • Application of projection in real life. Understand projection and its types. • Bezier curves. • Understand definition and examples of lebesgue integrals for bounded functions; • Lebesgue integrals for unbounded functions.



Head
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