DEPARTMENT OF MATHEMATICS
PROGRAMME: B. SC.

Statements of Programme Specific Outcomes (PSOs)

By the end of the course, the students will be able to:
- Join school as mathematics teacher.
- Prepare for competitive exams like MPSC,UPSC, GATE,CAT.
- Analyze and grasp abstract ideas to apply them to important practical problems.
- Develop strong analytical skills and a broad-based background in the mathematical sciences to join Indian industry.

Statement of Course Outcomes (COs)

B.Sc. Sem-I Paper-M 1: Algebra & Trigonometry

By the end of this course, Students will be able to:
- Use Matrices to solve system of linear equations.
- Understand the concept of Eigen value & Eigen vectors and method to find it.
- Find roots of polynomial equation in one variable.
- Understand the basic concept of complex analysis.
- Understand the basic concept of Group Theory.

B.Sc. Sem-I Paper-M 2: Calculus

By the end of this course, Students will be able to:
- Understand the concept of limit, continuity and differentiability of function of one variable, successive differentiation and Lebinitz's theorem.
- Understand the concept series expansions (Maclaurin & Taylor Series).
- Find limits of Indeterminate forms by using L'Hospital Rule.
- Understand the concept of partial differentiation, Euler's theorem, Jacobians.
- Solve definite integrals.

B.Sc. Sem-II Paper- M 3: Geometry, Differential & Difference Equations

By the end of this course, Students will be able to:
- Understand the concept of Geometry (line, Plane, Circle, Sphere, cone, cylinder).
- Solve first order exact differential equation, first order linear differential equation.
- Study Bernoulli's differential equation.
- Study higher order linear differential equation.
- Study Difference equation.

B.Sc. Sem-II Paper- M 4: Vector Calculus & Improper Integrals

By the end of this course, Students will be able to:
- Understand the concept of vector calculus (Gradient, Divergence, Curl).
- Understand the concept of line Integral, work done, conservative vector field.
- Use double integration to find area.
- Solve problems on vector Integration (Surface Integral, Volume Integral).
- Evaluate Improper Integrals.

B.Sc. Sem-III Paper-M 5: Advanced Calculus, Sequence & Series

By the end of this course, Students will be able to:
- Understand Mean Value Theorems, Limit & continuity of functions of two variables.
- Understand the concept of Minima & maxima of functions of two variables.
- Understand the concept of sequence.
- Understand the concept of series.

B.Sc. Sem-III Paper-M 6: Differential Equations & Group Homomorphism

By the end of this course, Students will be able to:
- Understand Bessel's & Legendre's functions with their properties.
- Understand the concept Laplace Transform & Inverse Laplace Transform.
- Solve Ordinary and Partial Differential Equations using Laplace transform.
- Understand the concept of Fourier Transform.
- Understand the concept of Group.

B.Sc. Sem-IV Paper-M 7: Partial Differential Equations & Calculus of Variation

By the end of this course, Students will be able to:
- Solve simultaneous differential equations.
- Form partial differential equations of first order.
- Use suitable method to find solution of partial differential equations of first order.
- Solve linear partial differential equations of higher order.
- Study calculus of variation.

B.Sc. Sem-IV Paper-M 8: Mechanics

By the end of this course, Students will be able to:
- Understand the concepts of equilibrium of coplanar forces, virtual work, catenary.
- Understand the concept of radial & transverse velocity, radial & transverse acceleration.
- Understand the concept of simple harmonic motion.
- Understand Mechanics of a system of particles.
- Study equations of motion.

B.Sc. Sem-V Paper-M 9: Analysis

By the end of this course, Students will be able to:
- Understand the concept of fourier series.
- Understand the concept Riemann-Stieltjes integral.
- Understand fundamental theorem of calculus.
- Understand basic concept of analytic functions.
- study Mobius transformation.

B.Sc. Sem-VI Paper-M 10: Metric Spaces, Complex Integration & Algebra

By the end of this course, Students will be able to:

- Examine countable and uncountable sets.
- Understand the concept Metric spaces.
- Understand the concept of Ring.
- Study complex integration.

M.Sc. Sem-V Paper-M 11: Abstract Algebra

By the end of this course, Students will be able to:
- Understand the concept of Group Automorphism.
- Give examples of vector spaces.
- Understand the concept of linear transformation.
- Link linear transformations with matrices.
- study inner product spaces.

B.Sc. Sem-V Paper-M 12 (Optional)

Special Theory of Relativity
By the end of this course, Students will be able to:
- Study Newtonian Relativity, Galilean Transformation.
- Understand failure of Newtonian Relativity.
- Study Einstein's Theory of Relativity, Lorentz Transformation.
- study Tensors, Riemannian metric, metric tensor.
- 5) Study Maxwell's equations of electromagnetic theory, equivalence of mass and energy $E=mc^2$.

B.Sc. Sem-V Paper-M 12 (Optional)

Discrete Mathematics and Elementary Number Theory
By the end of this course, Students will be able to:
- Distinguish between equivalence relation and partial order relation.
- Understand Boolean algebra.
- Study basic concept of Number Theory.
- Understand Greatest Integer Function, Quadratic Residues and Reciprocity.
- Study the Diophantine equations $ax+by=c$, the equations $x^2+y^2=z^2 \wedge x^4+y^4=z^4$.

B.Sc. Sem-V Paper-M 12 (Optional)

Differential Geometry
By the end of this course, Students will be able to:
- Study curve in space, its parametric representation, curvature of curve.
- Understand the concept of Envelopes, developable surfaces.
- Study curves on a surface, normal curvature.
- study differential equation of Geodesic, Curvature of Geodesic, Gaussian curvatu

1T1-Algebra I and 2T1-Algebra II

After completion of this course, students will be able to classify numbers into number sets. To

combine polynomial by addition or subtraction. To simplify algebraic expressions, using the commutative, associative and distributive properties.

It is the part of foundation for further studies in the field of computer science, cryptology, protection of financial accounts with encrypted codes, scheduling tasks on processors in a heterogeneous multiprocessor computing work, alteration of pattern pieces for precise seam alignment, crystal symmetry in chemistry.

Students after completing above course can think for above options.

1T2-Real Analysis I and 2T2-Real Analysis II

After completion of this course, students will be able to describe fundamental properties of the real numbers that lead to the formal development of real analysis. Construct rigorous mathematical proofs of basic results in real analysis. Appreciate how abstract ideas and methods in mathematical analysis can be applied to important practical problems

It is the part of foundation for further studies in the field of physics, engineering, optimization theory and economic analysis and research.

Students after completing above course work can work in above fields.

1T3-Topology I and 2T3-Topology II

After completion of this course, students will be able to analyze complex networks

Ex: Social networks, Biological networks, Internet etc.

But it is the part of foundation for above studies.

1T4-Linear Algebra and Differential Equations

Students after completing above course is able to do advance course in dynamical systems.

1T5-Integral Equations

Students after completing above course work will be able to do/solve the various problems in engineering sciences by using integral equations.

2T4-Differential Geometry

It is the part of foundation for further studies in the field of computer aided design of mechanical parts and assemblies, terrain modeling, colour balance in a photographic system ,optics for design of a reflector, cryptology, airflow patterns in the respiratory tract.

Students after completing above course have above options.

3T1-Complex Analysis

Upon successful completion of this course, the student will be able to:
- Justify the need for a Complex Number System and explain how is related to other existing number systems
- Define a function of complex variable and carry out basic mathematical operations with complex numbers.
- know the condition(s) for a complex variable function to be analytic and/or harmonic

- State and prove the Cauchy Riemann Equation and useit to show that a function is analytic.
- Define singularities of a function, know the different types of singularities, and be able to determine the points of singularities of a function
- Explain the concept of transformation in a complexspace (linear and non-linear)and sketch associated diagrams.
- Understand the concept of sequences and series with espect to the complex numbers system and establish whether a given series/ sequences is convergent/divergent at a specified point or interval.

2T5-Classical Mechanics
Students after completing above course work can work in the field of

3T2- Functional Analysis
Upon successful completion of this course, the student will be able to:
- Explain the fundamental concepts of functional analysis and their role in modern mathematics and applied contexts
- Demonstrate accurate and efficient use of functional analysis techniques.
- Demonstrate capacity for mathematical reasoning through analysing proving and explaining concepts from functional analysis.
- Apply functional analysis technique to diverse situations in physics, engineering and other mathematical context.

3T3-Mathematical Methods

3T5-Operations Research-I and 4T5- Operations Research-II
After studying this course, students will be able to:
- Give an appreciation of strategic importance of operations and supply chain management in a global business environment.
- Understand how an operation relates to other business function.
- Develop a working knowledge of concepts and methods related to designing and managing operations and supply chains.
- Develop a skill set for quality and process improvement.
- Develops how to manage and control the resource allocation.

4T1-Dynamical Systems
After completion of this course, students will be able to:
- Play an important role in modeling virtually every physically technical or biological process
- Assess differential equations widely used in formulating many fundamental laws of physics and chemistry.
- Use the theory to model the behavior of complex systems in economics and biology.

- Differential equations have a remarkable ability to predict the world around us. They can describe exponential growth and decay population growth of species or change in investment return over time.