Department of Mathematics
Outcome of NEP B.Sc. Programme

Programme Outcome:

- It is to give in-depth knowledge of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics. This also leads to study the related areas such as computer science and other allied subjects.
- The skills and knowledge gained in this program will be helpful for modeling and solving of real life problems.
- Students will become employable in various government and private sector.
- The completing this programme develop enhanced quantitative skills and pursuing higher mathematics and research as well.
- The completion of this programme will enable the learner to use appropriate digital programmes and software to solve various mathematical problems.

Programme Specific Outcome:

- Student should be able to think in a critical manner and develop problem solving skills.
- Students should be able to recall basic facts about mathematics and display knowledge of conventions such as notations, terminology etc.
- Students are able to formulate and develop mathematical arguments in a logical manner.
- Students are motivate and prepare for research studies in mathematics and related fields.
- Student should be able to apply their skills and knowledge in various fields of studies including, science, engineering, commerce and management etc.

Year-First

Course Title: *Matrices, Trigonometry and Differential Calculus*

Course outcomes:

- The programme outcome is to give foundation knowledge for the students to understand basics of mathematics including applied aspect for developing enhanced quantitative skills and pursuing higher mathematics and research as well.
- By the time students complete the course they will have wide ranging application of the subject and have the knowledge of matrices and basics of differentiation.
- The student will be able to sum the trigonometric series of real and complex numbers and separate the trigonometric function in form of A+iB.
- The main objective of the course is to equip the student with necessary analytic and technical skills. By applying the principles of differentiation, they learns to solve a variety of practical problems in science and engineering.
- The student is equipped with standard concepts and tools at an intermediate to advance level that will serve him well towards taking more advance level course in mathematics.

Course Title: *Practical*

Course outcomes:

- The main objective of the course is too familiar the student with different computer software such as Mathematica /MATLAB /Maple /Scilab/Maxima etc.
- The students will be able to compute various operations on matrices by using different computer software such as Mathematica /MATLAB /Maple/Scilab/Maxima etc.
- The students will also be able to compute nth derivative of various functions by using different computer software.

Course Title: Integral calculus and Vector Analysis

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Course outcomes:

- The Programme outcome is to give foundation knowledge for the students to understand basics of mathematics including applied aspect for developing enhanced quantitative skills and pursuing higher mathematics and research as well.
- By the time students complete the course they will have wide ranging application of the subject and have the knowledge of surface area and volume of shapes.
- The main objective of the course is to equip the student with necessary analytic and technical skills. By applying the principles of integral he learns to solve a variety of practical problems in science and engineering.
- The student is equipped with standard concepts and tools at an intermediate to advance level that will serve him well towards taking more advance level course in mathematics.

Year-Second

Course Title: Group Theory and Analytical Geometry

Course outcomes:

- Group theory is one of the building blocks of modern algebra. Objective of this course is to introduce students to basic concepts of Group and their properties.
- This course will lead the student to basic course in advanced mathematics and geometry.
- The subjects learn and visualize the fundamental ideas about coordinate geometry and learn to describe some of the surface by using analytical geometry.
- On successful completion of the course students have gained knowledge about regular geometrical figures and their properties. They have the foundation for higher course in geometry.
- On successful completion of the course students should have knowledge about higher different mathematical methods and will help him in going for higher studies and research.

Course Title: Ordinary Differential Equations and Ring Theory

Course outcomes:

- The objective of this course is to familiarize the students with various methods of solving differential equations of first and second order and to have qualitative applications.
- A student doing this course is able to solve differential equations and is able to model problems in nature using ordinary differential equations.
- After completing this course, a student will be able to take more courses on wave equation, heat equation, diffusion equation, gas dynamics, nonlinear evolution equation etc.
- Ring theory is one of the building areas of modern algebra. Objective of this course is to introduce students to basic concepts of Ring, Integral domain and other structures with their properties. This course will lead the student to basic course in advanced mathematics and Algebra.

Year-Third

Course Title: Real Analysis, Functions of several variables and Partial Differential Equations

Course outcomes:

- Students will be able to know the basic concepts and developments of real analysis which will prepare the students to take up further applications in the relevant fields.
- On successful completion of the course students should have knowledge about real analysis and will help him in going for higher studies and research.
- The main objective of the course is to equip the student with necessary analytic and technical skills.

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- The course in partial differential equation intends to develop problem solving skills for solving various types of partial differential equation especially hyperbolic, parabolic and elliptic types of PDE.

Course Title: Mathematical Methods and Graph Theory

Course outcomes:

- The student will be able to find the integral transform, Laplace transform, inverse Laplace transform and Fourier transform. The course in mathematical methods basically develops a problem solving skill in the students.
- Upon successful completion, students will have the knowledge of various types of graphs, their terminology and applications.
- After Successful completion of this course students will be able to understand the isomorphism and homomorphism of graphs.
- This course covers the basic concepts of graphs used in computer science and other disciplines.
- The topics include path, circuits, adjacency matrix, tree, coloring.
- After successful completion of this course the student will have the knowledge graph coloring, color problem, vertex coloring.

Course Title: Number Theory and Relativity

Course outcomes:

- The student will be able to solve problems in elementary number theory and also apply elementary number theory to cryptography.
- Upon successful completion, students will be able to describe the basic concepts of the theory of relativity.
- After Successful completion of this course students will be able to discuss postulates of the special theory of relativity and their consequences.

Course Title: Numerical Analysis and Operations Research

Course outcomes:

- After Successful completion of this course the student will be able to perform error analysis for arithmetic operations.
- Upon successful completion, students will be able to understand the use of interpolation and curve fitting and finite differences.
- After Successful completion of this course students will be able to use some solution methods for solving the linear programming problems.

Course Title: Complex Analysis and Mechanics

Course outcomes:

- The course is aimed at exposing the students to foundations of analysis which will be useful in understanding various physical phenomena and gives the student the foundation in mathematics.
- Upon successful completion, students will be able to understand the complex variables, analytic functions, complex integration and residues.
- The object of the paper is to give students knowledge of basic mechanics such as simple harmonic motion, motion under other laws and forces.
- The student, after completing the course can go for higher problems in mechanic such as hydrodynamics, this will be helpful in getting employment in industry.

Course Title: Linear Algebra and Metric Spaces

Course outcomes:

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- Liner algebra is a basic course in almost all branches of science. The objective of this course is to introduce a student to the basics of linear algebra and some of its applications.
- After Successful completion of this course, students should be able to understand the concept of vector spaces, linear transformation and various concepts regarding matrices.
- On successful completion of the course students should have knowledge about metric spaces, connectedness and compactness.

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Department of Mathematics

Programme Name- B.Sc. Mathematics

Programme Outcome

After successful completion of this programme, students will be able to -

- Know fundamental mathematical concepts and principles of various mathematical branches including algebra, calculus, geometry, analysis etc.
- Read and understand mathematical literature, including research papers and textbooks.
- Formulate and solve mathematical problems independently.
- Communicate mathematical ideas and results effectively, both orally and in writing.
- Understand historical and cultural contexts of mathematics and its role in society.
- Apply mathematical principles and techniques to analyze problems and find solutions using critical and logical reasoning in various fields, such as physics, engineering, and computer science.

Course Outcome

Year-I

Course Name- Differential Calculus

After successful completion of this course, students will be able to -

- Define Limit, Continuity, Differentiability of a function and Important theorems such as Rolle's theorem, mean value theorem, Intermediate value theorems and their application.
- Find the successive differentiation and nth differential coefficients.
- Taylor and Maclaurin series of functions and indeterminate forms.
- Define tangent and normal and their application for Cartesian and polar functions.
- Trace the curve and identify its singular points.
- Know about Curvature and asymptotes of functions.

Course Name- Integral Calculus and Trigonometry

After successful completion of this course, students will be able to -

- Understand the concept of integral as a limit of sum and properties of definite integral.
- Know the infinite integrals and differentiation and integration under de integral sign.
- Know about the Beta and Gamma functions, their properties and relation between them.
- Technique of evaluating double integrals and repeated integrals.
- Find the roots of the equation.
- Understand different Trigonometrical functions and Trigonometric series and their applications.

Course Name- Algebra and Matrices

After successful completion of this course, students will be able to -

- Distinguish among different numbers and identify the relation and mapping between different sets.
- Know the concept of matrices and define different types of matrices.
- Know about group structure and different types of groups.
- Application of matrices to find the solutions of system of linear homogeneous equations and non-homogeneous systems.
- Eigenvalues and eigenvectors of matrices and their useful application.

Year-II

Course Name- Differential Equation

After successful completion of this course, students will be able to -

- Understand the concept of order, degree and existence and uniqueness of the solution.

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- To solve the differential equations of first order and first degree and the differential equations of first order but not of first degree.
- To understand the concept of trajectory orthogonal trajectory, and self orthogonal family of curves.
- Find the solution of linear differential equations with constant coefficients and homogeneous differential equations.
- Solve simultaneous, exact, total differential equations and linear differential equations of second order with variable coefficients.
- Solve a differential equation by series solution method and also learn about the some applications differential equations.

Course Name- Real Analysis

After successful completion of this course, students will be able to -

- Understand the concept of continuity and differentiability of functions.
- Know about Riemann integral and mean value theorem of integral calculus.
- Identify the improper integral and test their convergence.
- Understand the concept of sequence and series and Cauchy's convergence criterion.
- Know about uniform convergence, point-wise convergence test of uniform convergence .

Course Name- Advanced Algebra

After successful completion of this course, students will be able to -

- Define ring, sub-ring and their properties.
- Understand the concept of ideal and define different type of ideals.
- Define Integral domain, field and their properties.
- Explain the concept of polynomial rings and their properties.
- Explain the fundamental concepts of advanced algebra and their role in modern mathematics

Year-III

Course Name- Linear Algebra and Linear Programming Problem

After successful completion of this course, students will be able to -

- The concept of vector spaces, linear transformation, rank, nullity and linear operators.
- Find eigenvalues and eigenvectors of different matrices and it's applications.
- Explain the concept of linear functional, dual space and dual basis.
- Explain the basics of Operations Research.
- Solve linear programming problem by different method like graphical and simplex methods.
- Know about transportation and assignment problems and their solutions.

Course Name- Complex Analysis

After successful completion of this course, students will be able to -

- Understand the concept of complex variable limit, continuity and differentiability.
- Know about analytic functions, Cauchy-Riemann equations and harmonic functions.
- Know about complex integration, Cauchy's theorem, poles and singularities.
- Know about residues and residues theorem and their application.
- Know about Liouville's theorem and their applications.
- Get Taylor's and Laurent's series of functions.

Course Name- Numerical Analysis

After successful completion of this course, students will be able to -

- Find absolute, relative percentage and general errors involved in calculations.
- Solve Algebraic and transcendental equations by Bisection method, Regula-Falsi method, Newton-Raphson method and Picard's iteration methods.
- Find the solution of linear system of equations by direct and iterative methods.

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- Find finite differences of a polynomial and errors in polynomial interpolation.
- Apply Newton's forward and Backward interpolation formula, and other interpolation formulas.
- Numerically differentiate and integrate a function by using a set of tabulated values.

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