

Department of Mathematics

Course: Mathematics (General Course)

Programme specific outcome:

After the completion of B.Sc. (General) in Mathematics, Students will able to

- develop the basic logic to think about the practical problems.
- develop mathematical skills to solve problems in various branches of mathematics
- appreciate the role of mathematical proof in formal deductive reasoning
- inculcate the ability to think independently and reason
- demonstrate the ability to analyze data and draw appropriate statistical conclusions.
- demonstrate the ability to apply analytical and theoretical skills to model and solve mathematical problems.
- recognize and appreciate the connections of mathematics with other branches of science.

Course Outcomes:

Semester –I [Core Paper] Topic: Differential Calculus

Course outcome: After successful completion of the course, Students will be able to:

- have an idea about a function from an algebraic, numerical, graphical and verbal perspective and extract information relevant to the phenomenon modeled by the function.
- verify the value of the limit of a function at a point using the definition of the limit
- identify a continuous curve and understand the difference between the limit and continuity of a function at a point.
- derive the expression for the derivative of elementary functions from the (limit) definition
- show whether a function is differentiable at a point.
- differentiate exponential, logarithmic, and trigonometric and inverse trigonometric functions
- interpret the geometrical and theoretical concepts of mean value theorems
- represent a function using infinite series.
- gain an idea about partial derivatives of function
- understand the application of ordinary and partial derivatives of a function.

Semester-II [Core Paper] Topic: Differential Calculus

Upon completion of this course, students will be able to

- incorporate a family of curves with its differential equation and will be able to find the differential equation of a given family of curves.
- be familiar with concepts of order, degree of a differential equation and be able to distinguish between linear, nonlinear, ordinary and partial differential equations.
- acquainted with various methods for solving mainly first order and second order ordinary and partial differential equations.
- interpret the difference between general solution and particular solution.
- understand the applications of differential equations.

Semester-III [Core Paper] Topic: Real Analysis

After successful completion of the course the students will be able to:

- understand the number system and point set theory
- know the basic postulates of real numbers
- gain the idea about the basic properties of real numbers
- get the knowledge of Sequence and Series of real numbers
- recognize the difference between pointwise and uniform convergence of sequence and series of functions.
- illustrate the effect of uniform convergence on the limit function and sum function with respect to continuity, integrability and differentiability.
- familiar with concepts of power series, radius of convergence and illustrate properties and convergence of power series.

Semester-IV [Core Paper] Topic: Algebra

Upon successful completion of the course the students will be able to

- gain the basic knowledge of the concepts of sets, relations.
- acquire knowledge of the concepts mappings and their types.
- gain working knowledge of important mathematical concepts like groups and subgroups
- compare the known algebraic structure with their abstract idea.
- have knowledge of many mathematical concepts studied in abstract algebra such as Permutation groups, Abelian groups, Cyclic groups and normal subgroups
- gain knowledge of homomorphism of groups, learn Isomorphism theorems and apply them to problems.
- introduce to the mathematical concepts of rings, zero divisors, Integral domains, fields and their properties.

Semester-V [DSE] Topic: Matrices

Upon completion of the course, students will able to

- acquire the idea of representing a system of equation in matrix form and its advantages
- determine the determinant of a square matrix
- gain the process of matrix operations , matrix transformation
- solve a system of equations by using the idea of matrices.
- determine the rank of a matrix and solve related problems
- apply matrices in geometry, physics, chemistry and combinatorics
- acquainted with the idea of vector spaces over the real field.
- acquainted with concepts of linear transformations, null space, range space.
- determine matrix representation of a linear transformation relative to ordered bases of finite dimensional vector spaces.
- learn change of basis theorems and apply them to problems.
- acquire the knowledge of eigen values and eigen vectors and their application.

Semester –V [Alternative DSE] Topic: Mechanics

After successful completion of the course the students will be able to

- acquire idea about the equilibrium of a particle of coplanar forces acting on a particle
- gather idea about rectilinear motion of particles
- to have idea about velocity and acceleration analysis of mechanisms using vector analysis approach
- know the laws of friction and to calculate the amount of friction acting on a body
- gain the idea of forces acting on a particle moving on a plain curve or a space curve.
- apply Equation of motion using Newton's laws to particles and rigid bodies
- understand about the type of forces, work, power and energy
- understand the idea of the centre of gravity of a particle.
- gain the concept of projectiles and solve related problems.

Semester-VI [DSE] Topic: Numerical Methods

After taking this course, the student should be able to

- gain the idea of error of approximation along with the approximation rules.
- have a clear idea of interpolation and its application in predicting different phenomena described by a function.
- use different interpolating polynomial viz. Newton's formula, Lagrange's formula, Stirling and Bessel's polynomial in different situations.
- use numerical differentiation formula
- find numerical integration formula viz. Trapezoidal formula, Simpson's one-third formula
- use the technique to solve differential equations numerically
- acquire ideas about the iteration method and its convergence.
- find some methods viz. bisection method, method of false position, method of fixed point iteration method, Newton's method, Secant method for solving an equation numerically upto certain degree of accuracy.
- use several available methods to Solve the simultaneous equations.

Semester VI [Alternative DSE] Topic: Linear Programming

After taking this course, the student should be able to

- state and describe the basic terminology and results concerning linear optimization and linear programming
- formulate practical problems in the form of an LPP
- describe duality and its implications for the solutions of linear programs.
- use the basic simplex method to solve linear programs and prove its convergence to a solution.
- gain idea about game theory, mainly two person zero sum game with saddle point or without saddle point.
- acquire the graphical and analytical technique to solve game problems

Semester-III/V [Skill Enhance Course] Topic: C Programming Language

Upon completion of this course, students will be

- able to know the fundamental concepts of hardware and software.
- able to gain knowledge of different number systems like Binary, Decimal, Octal, Hexadecimal and will be able to evaluate their conversions.
- able to have the idea of Algorithms and flowchart and will study their usage in problems.
- familiar with basic knowledge of High level language, Compiler & Interpreter.
- able to introduce the basic knowledge of programming using C.
- able to solve simple problems by programming in C.

Semester-IV/VI [Skill Enhance Course] Topic: Logic and Sets

After completion of the course students are expected to be able to:

- gain mathematical logic and will be able to explain statements with reasoning.
- analyze logical propositions via truth tables.
- prove mathematical theorems using mathematical induction.
- gain ideas about predicates and quantifiers.
- understand sets and perform operations and algebra on sets.
- determine properties of relations
- identify equivalence and partial order relations, sketch relations.