

B.SC. MATHEMATICS

2.6.1. Programme Outcome (PO) and Course Outcome (CO) (10)

- PO: 1.To develop critical thinking and reasoning .
- 2.acquire good knowledge and understanding in advanced area of mathematics
3. stimulate an interest in all aspects of mathematics .
4. develop skills like problem solving, numerical skills, analyzing things etc.

BSc Mathematics

Course Outcomes

MTS1B01 BASIC LOGIC AND NUMBER THEORY

Logic ,the study of principles of techniques and reasoning ,is fundamental to every branch of learning. Besides being the basis of all mathematical reasoning, it is required in the field of computer science for developing programming languages and also to check the correctness of the programmes. The classical number theory is introduced and some of the very fundamental results are discussed in this course. Number theory is an ideal topic for a beginner to illustrate how mathematicians do their normal business.

Objectives

- 1)Enable the students to enjoy and master several techniques of problem solving such as recursion,induction,etc,the importance of pattern recognition in mathematics, the art of conjecturing and a few applications of number theory.
- 2)acquire knowledge to read and enjoy on their own a few applications of number theory in the field of art ,geometry and coding theory.

Learning outcomes

- 1)understand the theory and method of solutions of LDE
- 2)Understand the theory of congruence and a few applications.
- 3)Solve linear congruent equations
- 4)Learn three classical theorems Wilson's theorem ,Fermat's Little theorem and .Eulers theorem and a few important consequences.

MTS2B02 CALCULUS OF SINGLE VARIABLE -1

The Mathematics required for viewing and analyzing the physical world around us is contained in calculus. While algebra and geometry provide us very useful tools for expressing the relationship between static quantities, the concepts necessary to explore the relation between moving/changing objects are provided in calculus.

Objectives

- 1) The objective of the course is to introduce students to the fundamental ideas of limit, continuity, and differentiability and also to some basic theorem of differential calculus.
- 2) It also helps to know how these ideas can be applied in problem of sketching of curves and in the solution of some optimization problem of interest in real life.

Learning outcomes

1. understand the fundamental ideas of limit, continuity and differentiability
2. understand the branch of integral calculus.
3. understand the concept of definite integrals.
4. learn the fundamental theorem of calculus.

MAT4 B04: Theory of Equations, Matrices & Vector Calculus

This course details about polynomial equations and fundamental theorem of algebra. Explain the rank of matrices and its Canonical form, Normal form. Discusses about Expressing Systems of Linear equations in matrix form and to find the solution of the systems. Characteristic roots and characteristic vectors are also introduced.

Objectives

- 1) Introduce concept of rank of a matrix and methods to find the rank
- 2) Discuss the fundamental theorem of algebra and polynomial eqns.
- 3) Study about system of equations and methods to solve them.

Learning Outcomes

- 1) Students will be able to find rank of matrices and apply them in practical problems. and use Cayley Hamilton theorem to compute inverse of matrices.
- 2) They can solve system of linear equations.
- 3) They will get knowledge about polynomial equations and Algebra.

MAT5 B05: Vector Calculus

Course gives an introduction to function of several variables and partial differentiation. Terms like directional derivatives, gradient vectors are defined and analyzed. The course discusses triple integrals, Line integrals and Green's and Stoke's Theorems.

Objectives

1. Introduce concepts of functions of several variables and Partial differentiation.

2. Discuss directional derivatives, double integrals and Lagrange multipliers
3. Introduce Triple integrals, Line integrals and study about these integrals in Cylindrical and Spherical coordinates.
4. Study about Green's, Stoke's Theorems and applications.

Learning Outcomes

1. Students can find derivatives of functions of several variable using chain rules and apply the technique of partial differentiation effectively.
2. Students can understand the concept of directional derivatives, saddle points and apply the theory of double integrals.
3. Students will get an idea of the coordinate systems and higher integrals.
4. They can apply Green's and Stokes's theorems in practical problems.

MAT5 B06: Abstract Algebra

This course serves an introduction to abstract algebra. The course aims at an attempt to introduce axiomatic treatment of mathematics. Course aims to teach students about groups rings and fields.

Objectives

1. Introduce the idea of groups, rings and fields.
2. Give a peek to the axiomatic approach of mathematics
3. Define and study about Integral domains and Field of quotients.

Learning Outcomes

1. Students will get a deep and fundamental knowledge about Groups, rings and Fields.
2. Students can understand the basic properties of these structures.
3. Students will get the basic idea of integral domains.
4. The students will be able to understand and prove mathematical statements in a logical and rigid manner.

MAT5 B07: Basic Mathematical Analysis

This course provides a quick review of sets and mathematical induction. Course tries to spread light on the real number line and the properties of real numbers. Sequences and subsequences are also discussed in this course.

Objectives

1. Give a basic idea of real number system
2. Discuss the important properties of real numbers.
3. Define sequences and subsequences of real numbers
4. Study about limits and discuss limit theorems.

Learning Outcomes

1. Students will get an in-depth knowledge about real numbers and their properties.
2. Students will be able to understand and analyze the properties of real sequences.

MAT5 B08: Differential Equations

This course studies about the ordinary differential equation involving one independent and one or more dependent variables. The integrals of ordinary differential equation are evaluated and are found to be plane curves. Differential equation involving one dependent and more than one independent variables are studied.

Objectives

1. To classify differential equations
2. Discuss the methods to solve first and second order equations
3. Introduce Laplace Transforms and PDE
4. Solve boundary value problems, study about Fourier series

Learning Objectives

1. Students can use the idea of differential equations in engineering problems.
2. Students will get a basic idea of important equations like wave equation and heat equations.
3. Students can use the technique of Fourier series to solve wave and heat equations effectively
4. The students will know relation between heat equation and Laplace eqns.

MAT6 B09: Real Analysis

This course provides a quick review of continuous functions and continuity. The idea of Riemann integral is introduced. Course gives a brief discussion about series of real numbers, Improper integrals, Beta and Gamma functions.

Objectives

1. To study about Riemann integrals and its applications
2. Review series of real numbers and their convergence
3. Define and in depth study of Improper integrals
4. Introduce Beta and Gamma functions.

Learning Outcomes

1. Students can understand and apply the concepts of Riemann integrals
2. Students will be able to find convergence of real series
3. Students can evaluate improper integrals using various techniques
4. Facilitate use of Beta and Gamma integrals in various situations.

MAT6 B10: Complex Analysis

This course introduces the concepts analytic function, elementary complex functions, and their properties, basic methods of complex integration and its applications in contour integration.

Objectives: The course aims

1. To explain the fundamental ideas of Analytic functions
2. To discuss basic methods of complex integration
3. To introduce elementary complex functions
4. To discuss power series expansion of analytic functions

Learning Outcomes: On completion of this course, the students will be able to

1. Conceive the concept of analytic functions and will be familiar with the elementary complex functions and their properties
2. They will be familiar with the theory and techniques of complex integration
3. Apply the theory of the power series expansion of analytic functions.

MAT6 B11: Numerical Methods

This course aims to familiarize students with different methods of Numerical Analysis. Course also discusses the methods to solve Linear Systems including ODE.

Objectives

1. To equip the student with the computer based numerical and statistical methods.
2. Explain and analyze errors in computation and their minimization
3. Discuss normal and iterative methods to solve linear equations, ODE

4. Study about curve fitting, Numerical differentiation.

Learning Outcomes

1. Students can use numerical methods to solve mathematical problems
2. They will get an idea of numerical differentiation and integration
3. Students will get a better understanding of finite differences
4. Students will be able to find numerical solutions to ODE and linear eqns

MAT6 B12: Number Theory and Linear Algebra

The course gives a brief introduction to theory of numbers. Important theorems like Fermat's theorem and Wilson's theorem is discussed. The concepts of Vector space and linear transformations are introduced.

Objectives

1. To introduce results of basic number theory
2. Introduce divisibility theory and Congruences
3. Study Fermat's and Wilson's Theorem
4. Impart basic idea of vector spaces and linear transformations

Learning Outcomes: After completion of this course students

1. Can use the theory of numbers, division algorithm and congruences in the field of Computer science and Mathematics.
2. Can apply these ideas in studying cryptography and network security
3. Will get a brief idea about vector spaces and related concepts

MAT6 B13 (E01): Graph Theory

This course introduces the Graphs and allied properties. Various types of graphs are discussed along with the techniques of coloring graphs, Planarity and Matchings.

Objectives

1. Introduce graphs and its origin as an important tool of computation.
2. Study about various types of graphs like line graphs, Eulerian and Hamiltonian graphs.
3. Discuss properties of graphs, like isomorphic graphs.
4. Define colorings, Matching and study about Planarity and Chromatic polynomials in graphs.

Learning Outcomes

1. Facilitate the use of graphs as an important tool in day-to-day activities in life like navigation and road maps.
2. Students can understand the intrinsic, structural properties of graphs
3. Students can get a better understanding of various aspects of graphs like planarity and coloring.

MAT5 D18: Mathematics for Natural Sciences

This course aims to introduce fundamental mathematical concepts to students of branches other than Mathematics. It gives a glimpse to statistical data collection and other concepts like moments and central tendencies in statistics.

Objectives

1. Familiarize the students with sets and operations on sets.
2. Introduce the idea of frequency distribution and data analysis
3. Define and analyze measures of central tendencies
4. Study about the theory of probability and probability distributions.

Learning Outcomes

1. Students shall get basic idea about sets
2. Students will have an understanding of frequency distributions and data tabulation.
3. They will get an idea of measures of central tendencies
4. Students will get familiarized with probability distributions.