## 24MA121 Basic Mathematics

**Course Category: Basic Sciences (BS)** **2L 1T 0P 4C**
**Pre – requisite: 10 + 2 Mathematics**

**Course Description:**

In mathematics, sets and relations are fundamental concepts that serve as building blocks for various mathematical structures and theories. Logarithms are mathematical functions that quantify the relationship between exponential growth and decay. They are particularly useful for simplifying calculations involving very large or very small numbers, as well as for solving equations involving exponents. Matrices are fundamental mathematical objects that consist of a rectangular array of numbers (or elements) arranged in rows and columns.

**Course Aims and Objectives:**

1. Developing foundational skills, understanding abstract structures, and applying algebraic concepts to solve problems across various disciplines.
2. Analyze mathematical expressions that involve square roots (and sometimes higher roots) of numbers that cannot be simplified to rational numbers.
3. Teach mathematical expressions that involve square roots (and sometimes higher roots) of numbers that cannot be simplified to rational numbers.
4. Describe different forms of linear equations, such as slope-intercept form, point-slope form, and standard form.
5. Identify and understand special types of matrices, such as square matrices, symmetric matrices, diagonal matrices, identity matrices, and zero matrices.

### Course Outcomes:

At the end of the course, the student will be able to
**CO1:** Understand the concept of sets and relations.[k2]
**CO2:** Apply the method of rationalisation in surds.[K3]
**CO3:** Understand Co-ordinate system and Locus.[K2]
**CO4:** Analyze the Point of intersection of two straight lines.[K4]
**CO5:** Apply the Rank of a given matrix.[K3]
**Course Structure:**

**UNIT – I : SETS & RELATIONS** **(9Hours)**
Definition of a Set with examples, Finite and Infinite sets, Equality of sets, Subsets, Power set, Universal set, Union and Intersection of sets, Relations, Equivalence relations and related problems.

**UNIT – II: SURDS & LOGARITHMS** (9Hours)
Definition of a Surd, Pure and Mixed surds, Similar surds, Monomial surds, Binomial Surds, Rationalisation, Logarithms, Properties of Logarithms, Common Logarithms.
**Description:** Logarithms are mathematical functions that describe the relationship between numbers in terms of exponentiation. They are fundamental in various fields of mathematics, science, and engineering for simplifying calculations involving large numbers or exponential growth and decay.

**UNIT – III: COORDINATE GEOMETRY** (9Hours)

Co-ordinate system, Distance between two points, Division formula, Centroid, Areas of Triangles and Quadrilaterals, Definition of a Locus, Equation of Locus and related problems.

**UNIT – IV: STAIGHT LINES** (9Hours)

Definition of a Straight Line, Different forms, Reduction of general equation into various forms, Point of intersection of two straight lines and their application.

**Description:** Straight lines are fundamental elements that play a crucial role in defining shapes, measuring distances, and understanding relationships between points, among other applications.

**UNIT – V: MATRICES** (9Hours)

Definition of a Matrix, Types of matrices, Examples, Addition of Matrices, Subtraction of Matrices, Scalar multiple of a matrix, Multiplication of matrices, Transpose of a matrix and determinants, Minors and Cofactors, Adjoint of a matrix, Inverse of a matrix, Rank of a matrix and examples.

**Text Books:**


1. Bhattacharya P.B, Jain S.K & Nagpaul S.R. (2016). *Basic Abstract Algebra* (2nd Edition). Cambridge University Press.
2. Khanna M. *Co-ordinate Geometry*. Jai PrakashNath Publications.

**ReferenceBooks :**


1. Seymour Lipschutz. (1998). *Set Theory and Related Topics* (2nd Edition). Schaum's Outline.
2. Kaj L. Nielsen (1943). *Logarithmic and Trigonometric Tables.* Barnes & Noble Books.