Department of Biotechnology
B. Tech. (Biotechnology)

Elementary Mathematics

Course Code: NMA105 **L-T-P-C: 3-1-0-4**

Course Outcomes: At the end of this course, the students are expected to:

CO 1	solve a system of equations by matrix method and trigonometry
CO 2	know the concept of differentiation, integration and evaluation of area and volume by integration techniques
CO 3	explain the concept of ordinary differential equations and have learnt the methods of solving second order differential equations with constant coefficients
CO 4	understand the concept of vector algebra
CO 5	use the mathematical logic and basic probability for higher studies

Unit 1: Matrices

Matrices-types of matrices-operations on matrices-determinants-adjoint matrix-inverse of a matrix.

Unit 2: Differential and Integral Calculus

Differentiation of functions of single variable - differentiation techniques physical interpretations - differentiation of implicit function-higher order derivatives-Taylor's series-maxima and minima for functions of a single variable.

Integral Calculus: Partial Fractions-Integration-integration techniques-integration by parts definite integrals-properties- evaluation of area and volume by integration.

Unit 3: Linear Ordinary Differential Equations

Differential equations-definition and examples-formation of differential equation-solving differential equations of first order-solving second order homogenous differential equations with constant coefficients.

Unit 4: Vector Algebra

Vectors-operations on vectors-angle between two vectors-projection of one vector on another vector-equations of plane, straight line and sphere in vector forms-shortest distance between two skew lines- equation of a tangent plane to a sphere.

Unit 5: Logic and Probability

Mathematical logic propositions- truth table-connectives- tautology- contradiction. Permutations and combinations-probability-classical approach-addition law-conditional probability -multiplicative law- Baye's theorem and applications.

Textbooks:

1. Higher Engineering Mathematics by B. S. Grewal (Khanna Publishers)
2. A Textbook of Engineering Mathematics by N. P. Bali and Manish Goyal (Laxmi Publications)

Reference Books:

1. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley India)
2. Engineering Mathematics by S. S. Sastry (PHI Learning Pvt. Ltd.)