3BCA4(B) & 3BCA4(C) -FUNDAMENTALS OF MATHEMATICS-I
(ADVANCED CALCULUS AND MATRICES)

UNIT – I

Definition of a function as a map between sets, Definition of a real valued function of a real variable. Graphical representation of a function as a curve in 2-dimensions. Equation of a straight line and of a curve. Tangent to a curve. Equations of tangent to a curve. Representation of real numbers on a computer. Graphical representation of a function on a computer screen.

UNIT- II

Derivative as tangent to a curve. Continuity and differentiability. Definition of a limit, and derivative as a limit. Derivative as a linear map. Derivatives of products and composites: Leibniz rule and chain rule. Applications to maxima and minima. Second derivative, and its use for testing extrema. Applications to root finding.

UNIT- III

Integral as anti-derivative. Relation to integral as area under a curve. Integral as a limit. Integration by parts, Change of variables formula. Elementary techniques of numerical quadrature.

UNIT- IV

Higher derivatives. Statement of Taylor's theorem in one variable. Euler-Maclaurin expansion and its applications to numerical computing. Difficulties in numerical computation of derivatives as limits.

UNIT – V

Ordinary differential equations.Statement of Peano's existence theorem.Calculation of numerical solution by Euler's method.Basics of Runge-Kutta methods.

UNIT - VI

Matrix algebra: addition and multiplication of matrices. Inverse of a non-singular matrix. Determinant of a matrix. Testing non-singularity using determinants. Solution of systems of linear equations using matrices and determinants.

TEXTS AND REFERENCE BOOKS :-

- *S.S.SASTRY, "ENGINEERING MATHEMATICS", Prentice Hall of India*