I Year-II Semester		L	T	P	C
		3	0	0	3

MATHEMATICS-II (R19BS1202)

Prerequisite Course: Operation of Scientific Calculator

Course Description and Objectives:

To understand the concept of Matrices in solving linear algebraic equations, elucidate the different numerical methods to solve nonlinear algebraic equations and disseminate the use of different numerical techniques for carrying out numerical integration to handle various real world problems and their applications.

Course Outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes.

CO	Course Outcomes	POs
1	Solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel	4
2	Develop the use of matrix algebra techniques that is needed by engineers for practical applications	5
3	Evaluate approximating the roots of polynomial and transcendental equations by different algorithms	4
4	Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals	4
5	Apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations	4

Syllabus:

UNIT I:

Solving system of linear equations, Eigen values and Eigen vectors:

Rank of a matrix by echelon form and normal form – Solving system of homogeneous and nonhomogeneous equations linear equations – Gauss Elimination for solving system of equations – Eigen values and Eigen vectors and their properties.

UNIT II:

Cayley-Hamilton theorem and Quadratic forms:

Cayley - Hamilton theorem (without proof) – Finding inverse and power of a matrix by Cayley-Hamilton theorem – Reduction to Diagonal form – Quadratic forms and nature of the quadratic forms – Reduction of quadratic form to canonical forms by orthogonal transformation. Singular values of a matrix, singular value decomposition

UNIT III:

Iterative methods:

Introduction – Bisection method – Secant method – Method of false position – Iteration method – Newton-Raphson method (One variable and simultaneous Equations) – Jacobi and Gauss-Seidel methods for solving system of equations.

UNIT IV:

Interpolation:

Introduction – Errors in polynomial interpolation – Finite differences – Forward differences – Backward differences – Central differences – Relations between operators – Newton's forward and backward formulae for interpolation – Interpolation with unequal intervals – Lagrange's interpolation formula – Newton's divide difference formula.

UNIT V:

Numerical integration and solution of ordinary differential equations:

Trapezoidal rule – Simpson's 1/3 rd and 3/8 th rule – Solution of ordinary differential equations by Taylor's series – Picard's method of successive approximations – Euler's method – Runge-Kutta method (second and fourth order).

TEXT BOOKS:

1. B. S. Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. B. V. Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

REFERENCE BOOKS:

1. David Poole, Linear Algebra- A modern introduction, 4th Edition, Cengage.
2. Steven C. Chapra, Applied Numerical Methods with MATLAB for Engineering and Science, Tata Mc. Graw Hill Education.
3. M. K. Jain, S. R. K. Iyengar and R. K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publications.
4. Lawrence Turyn, Advanced Engineering Mathematics, CRC Press.