MATHEMATICS - II

UNIT I -VECTOR CALCULUS

Vector fields - Vector fields, Graphical representation of vector fields, Scalar and vector fields.**Gradient And Divergence -** Gradient of a scalar, Geometrical interpretation, Laplacian of a scalar field, Properties, Example problems.**Curl And Vector Identities -** Curl of a vector field, Properties, Vector Identities, Theorems, Example problems. **Line integrals** - Line integrals, Example problems.**Flux, Solenoidal and Irrotational –**Solenoidal, Example problems, Irrotational,Example problems, Flux of a vector field across a surface, Example problems. **Gauss Divergence theorem -** Gauss's divergence theorem, Example problems. **Green's Theorem -** Green's Theorem, Example problems. **Stoke's theorem** - Stoke's theorem, Example problems.

UNIT II -FOURIER SERIES AND FOURIER TRANSFORMS

Fourier series - History of Fourier Series, Periodic Function, Example, Introduction of Fourier Series, Dirichlet Conditions, Determination of Fourier Coefficients, Euler's Formula, Example problems. **Function having points of discontinuity -** Functions having points of discontinuity, Example problems.**Even and odd functions -** Even and odd functions, Fourier Series For Even And Odd Function, Example problems. **Half range fourier series -** Introduction to Half–Range Fourier Series, Example problems.**Statement of Fourier integral theorem -** Integral transforms, Fourier integral theorem, Example problems. **Fourier sine and cosine integral -** Fourier sine and cosine integral, Example problems.**Fourier sine transforms -** Fourier sine transforms, Example problems.**Fourier cosine transform -** Fourier cosine transform**,** Properties 1 to 7, Example problems. **Finite Fourier transforms -** Finite Fourier Sine and Cosine tranforms**,**Example problems.

UNIT III -INTERPOLATION AND CURVE FITTING

Interpolation - Errors in polynomial interpolation, Finite differences, Forward difference, Backward differences, Example for Backward difference, Central differences, Introduction to Symbolic relations and seperation of symbols, Introduction to Differences of a polynomial, Example problems. **Newton's formulae for interpolation -** Newton's formulae for interpolation, Newton's Forward interpolation formulae, Newton's Backward interpolation formulae, Example problems. **Central difference interpolation Formula -** Central difference interpolation Formula, Central Gauss Forward interpolation Formula, Central Gauss Backward interpolation Formula, Example problems. **Newton's divided difference interpolation -** Divided differences, Newton's divided difference formula, Example problems. **Lagrange's divided difference interpolations -** Lagrange's Interpolation formula, Example problems. **Least square curve fitting procedures -** Introduction of Curve Fitting,Fitting a straight line,Non linear curve fitting, Example problems.

UNIT IV -NUMERICAL TECHNIQUES

Introduction - Solution of algebraic and transcendental equations, Important properties of equations.**Graphical interpretation of solution -** Numerical techniques, Graphical interpretation of solution of equations, Example problems. **The bisection method –** Introduction, The bisection method,Example problems. **The method of false position -** Method of false position**,** Example problems. **The Iteration method -** The Iteration method,Example problems. **Newton-Raphson method -** Newton-Raphson method, Convergence of Newton-Raphson method, Quadratic convergence of Newton-Raphson method, Newton-Raphson Extended Formula (or) chebyshev's formula of third order, Example problems. **LU Decomposition method -** LU Decomposition method, Example problems. **Guass Jacobi iteration method -** Iterative methods,Example problems. **Guass Seidel method -** Gauss Seidel Method,Example problems.

UNIT V -NUMERICAL INTEGRATION AND NUMERICAL SOLUTIONS OF DIFFERENTIAL EQUATIONS

Numerical integration - Numerical integration, Newton - Cote's Quadrature Formula, Trapezoidal rule, Geometrical interpretation, Example problems, Simpson's 1/3 rule, Example problems, Simpson's 3/8 rule, Example problems. **Two point and three point Gaussian quadrature formulae -** Gauss quadrature, Example problems, Gaussian quadrature(3-point formula), Example problems. **Picard's method of Successive Approximations -** Picard's method of Successive Approximations,Example problems. **Taylor series method -** Taylor series method,Example problems. **Euler's method-** Euler's Method, Example problems. **Improved Euler method -** Improved Euler method, Improved Euler method (Heun's method), Example problems. **Runge-kutta method of fourth order -** Runge-kutta methods, Example problems. **Boundary values and Eigen value problem -** Shotting method, Example, Finite difference method, Example problems, Largest Eigenvalue and the corresponding Eigenvector: By power method, Example problems.