



Indraprastha College for Women

University of Delhi

Course Name:	Generic Elective Course
Paper Title:	Numerical Methods
Unique Paper Code:	32355402
Semester:	V
Faculty(s):	Dr Pardeep Kumar, Dr Suman
Year:	2026

Work Plan			
Period	Unit No.	Learning Objective	Topics to be Covered
1 st Aug-3 rd Aug	I	Acquaint students with various topics in numerical solutions of nonlinear equations in one variable, interpolation and approximation, numerical differentiation and integration, direct methods for solving linear systems, numerical solution of ordinary differential equations using Computer Algebra System (CAS).	Errors: Round off error, Local truncation error, Global truncation error; Order of a method, Convergence, and terminal conditions
5 th Aug-10 th Aug	I	Acquaint students with various topics in numerical solutions of nonlinear equations in one variable, interpolation and approximation, numerical differentiation and integration, direct methods for solving linear systems, numerical solution of ordinary differential equations using Computer Algebra System (CAS).	Errors: Round off error, Local truncation error, Global truncation error; Order of a method, Convergence, and terminal conditions
12 th Aug-17 th Aug	I	Acquaint students with various topics in numerical solutions of nonlinear equations in one variable, interpolation and approximation, numerical differentiation and integration, direct methods for solving linear systems, numerical solution of ordinary differential equations using Computer Algebra System (CAS).	Bisection method, Secant method, Regula-Falsi method, Newton-Raphson method.

19 th Aug-24 th Aug	II	Acquaint students with various topics in numerical solutions of nonlinear equations in one variable, interpolation and approximation, numerical differentiation and integration, direct methods for solving linear systems, numerical solution of ordinary differentialequations using Computer Algebra System (CAS).	Gaussianeliminationmethod (withrowpivoting);Iterative methods: Jacobi method, Gauss–Seidel method.
26 th Aug-31 st Aug	II	Acquaint students with various topics in numerical solutions of nonlinear equations in one variable, interpolation and approximation, numerical differentiation and integration, direct methods for solving linear systems, numerical solution of ordinary differential equations usingComputerAlgebraSystem (CAS).	Gaussianeliminationmethod (withrowpivoting);Iterative methods: Jacobi method, Gauss–Seidel method.
2 nd Sep-7 th Sep	II	Acquaint students with various topics in numerical solutions of nonlinear equations in one variable, interpolation and approximation, numerical differentiation and integration, direct methods for solving linear systems, numerical solution of ordinarydifferentialequations using Computer Algebra System (CAS).	Gaussianeliminationmethod (withrowpivoting);Iterative methods: Jacobi method, Gauss–Seidel method.
9 th Sep-14 th Sep	II	Acquaint students with various topics in numerical solutions of nonlinear equations in one variable, interpolation and approximation, numerical differentiation and integration, direct methods for solving linear systems, numerical solution of ordinary differential equations usingComputerAlgebraSystem (CAS).	Interpolation: Lagrange form, Newtonform,Finitedifference operators.
16 th Sep-21 st Sep	II	Acquaint students with various topics in numerical solutions of nonlinear equations in one variable, interpolation and approximation, numerical differentiation and integration, direct methods for solving linear systems, numerical solution of ordinary differential equations usingComputerAlgebraSystem (CAS).	Interpolation: Lagrange form, Newtonform,Finitedifference operators.
23 rd Sep-28 th Sep	II	Acquaint students with various topics in numerical solutions of nonlinear equations in one variable,interpolationand approximation, numerical	Interpolation: Lagrange form, Newtonform,Finitedifference operators.

		differentiation and integration, direct methods for solving linear systems, numerical solution of ordinary differential equations using Computer Algebra System (CAS).	
30 th Sep-5 th Oct	III	Acquaint students with various topics in numerical solutions of nonlinear equations in one variable, interpolation and approximation, numerical differentiation and integration, direct methods for solving linear systems, numerical solution of ordinary differential equations using Computer Algebra System (CAS).	First and second order numerical derivatives.
7 th Oct-12 th Oct	III	Acquaint students with various topics in numerical solutions of nonlinear equations in one variable, interpolation and approximation, numerical differentiation and integration, direct methods for solving linear systems, numerical solution of ordinary differential equations using Computer Algebra System (CAS).	First and second order numerical derivatives.
14 th Oct-19 th Oct	III	Acquaint students with various topics in numerical solutions of nonlinear equations in one variable, interpolation and approximation, numerical differentiation and integration, direct methods for solving linear systems, numerical solution of ordinary differential equations using Computer Algebra System (CAS).	First and second order numerical derivatives.
21 st Oct-26 th Oct	III	Acquaint students with various topics in numerical solutions of nonlinear equations in one variable, interpolation and approximation, numerical differentiation and integration, direct methods for solving linear systems, numerical solution of ordinary differential equations using Computer Algebra System (CAS).	Trapezoidal rule, Simpson's rule for numerical integration; Ordinary differential equation: Euler's, and Runge-Kutta method.
28 th Oct-2 nd Nov			MIDSEMESTER BREAK
4 th Nov-9 th Nov	III	Acquaint students with various topics in numerical solutions of nonlinear equations in one variable, interpolation and approximation, numerical differentiation and integration, direct methods for solving linear systems, numerical solution of	Trapezoidal rule, Simpson's rule for numerical integration; Ordinary differential equation: Euler's, and Runge-Kutta method.

		ordinary differential equations using Computer Algebra System (CAS).	
11 th Nov-16 th Nov	III	Acquaint students with various topics in numerical solutions of nonlinear equations in one variable, interpolation and approximation, numerical differentiation and integration, direct methods for solving linear systems, numerical solution of ordinary differential equations using Computer Algebra System (CAS).	Trapezoidal rule, Simpson's rule for numerical integration; Ordinary differential equation: Euler's, and Runge-Kutta method.
18 th Nov-23 rd Nov	III	Acquaint students with various topics in numerical solutions of nonlinear equations in one variable, interpolation and approximation, numerical differentiation and integration, direct methods for solving linear systems, numerical solution of ordinary differential equations using Computer Algebra System (CAS).	Trapezoidal rule, Simpson's rule for numerical integration; Ordinary differential equation: Euler's, and Runge-Kutta method.
25 th Nov-27 th Nov			Revision

Unit	TOPICS
I	Errors and Roots of Transcendental and Polynomial Equations Errors: Round off error, Local truncation error, Global truncation error; Order of a method, Convergence, and terminal conditions; Bisection method, Secant method, Regula-Falsi method, Newton-Raphson method.
II	Algebraic Linear Systems and Interpolation Gaussian elimination method (with row pivoting); Iterative methods: Jacobi method, Gauss-Seidel method; Interpolation: Lagrange form, Newton form, Finite difference operators.
III	Numerical Differentiation, Integration and ODE First and second order numerical derivatives; Trapezoidal rule, Simpson's rule for numerical integration; Ordinary differential equation: Euler's, and Runge-Kutta method.
S.No.	Name of Authors/Books/Publishers
1.	Chapra, Steven C. (2018), Applied Numerical Methods with MATLAB for Engineers and Scientists (4th ed.). McGraw-Hill Education.
2.	Fausett, Laurene V. (2009), Applied Numerical Analysis Using MATLAB. Pearson. India

3.	Jain,M.K.,Iyengar,S.R.K.,&JainR.K.(2012),NumericalMethodsforScientificand Engineering Computation (6th ed.). New Age International Publishers. Delhi.
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