Indraprastha College for Women
University of Delhi

Course Name:	Generic Elective Course
Paper Title:	Numerical Methods
Unique Paper Code:	
Semester:	V
Faculty(s):	Dr Sulekha Rani
Year:	2024

Work Plan

Period	Unit No.	Learning Objective	Topics to be Covered
1st Aug -3rd 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: Roundoff error, Local truncation error, Global truncation error; Order of a method, Convergence, and terminal conditions
5th Aug-10th 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: Roundoff error, Local truncation error, Global truncation error; Order of a method, Convergence, and terminal conditions
12th Aug-17th 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.

19th Aug-24th 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 using Computer Algebra System (CAS).	Gaussian elimination method (with row pivoting); Iterative methods: Jacobi method, Gauss−Seidel method.
26th Aug-31st 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 using Computer Algebra System (CAS).	Gaussian elimination method (with row pivoting); Iterative methods: Jacobi method, Gauss−Seidel method.
2nd Sep-7th 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 using Computer Algebra System (CAS).	Gaussian elimination method (with row pivoting); Iterative methods: Jacobi method, Gauss−Seidel method.
9th Sep-14th 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 using Computer Algebra System (CAS).	Interpolation: Lagrange form, Newton form, Finite difference operators.
16th Sep-21st 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 using Computer Algebra System (CAS).	Interpolation: Lagrange form, Newton form, Finite difference operators.
23rd Sep-28th Sep	II	Acquaint students with various topics in numerical solutions of nonlinear equations in one variable, interpolation and approximation, numerical	Interpolation: Lagrange form, Newton form, Finite difference operators.

		differentiation and integration, direct methods for solving linear systems, numerical solution of ordinary differential equations using Computer Algebra System (CAS).	
30th Sep-5th 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.
7th Oct-12th 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.
14th Oct-19th 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.
21st Oct-26th 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.
28th Oct-2nd Nov			MID SEMESTER BREAK
4th Nov-9th 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).	
11th Nov-16th 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.
18th Nov-23rd 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.
25th Nov-27th Nov			Revision
28th Nov	DISBERSAL OF CLASSES		

Unit	TOPICS
I	**Errors and Roots of Transcendental and Polynomial Equations** Errors: Roundoff 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., & Jain R. K. (2012), Numerical Methods for Scientific and Engineering Computation (6th ed.). New Age International Publishers. Delhi.