



Indraprastha College for Women

University of Delhi

Course Name:	B.Sc. (hons.) Mathematics
Paper Title:	Numerical Analysis
Unique Paper Code:	
Semester:	IV
Faculty(s):	Mr. Ashutosh Rajput, Dr. Manju Sharma and Dr. Suman
Year:	2024

Unit No.	Lecture No.	Topics to be Covered
Unit I	1	Bisection method
	2	Bisection method
	3	Newton-Raphson method
	4	Newton-Raphson method
	5	Secant method
	6	Secant method
Unit II	7	LU decomposition method
	8	LU decomposition method
	9	LU decomposition method
	10	Gauss–Jacobi method
	11	Gauss–Jacobi method
	12	Gauss–Seidel method
Unit III	13	Lagrange interpolation
	14	Lagrange interpolation
	15	Newton interpolation
	16	Newton interpolation
	17	Trapezoidal rule
	18	Trapezoidal rule
	19	Simpson's rule
	20	Simpson's rule

21	Simpson's rule
22	Simpson's rule
23	Euler's method
24	Euler's method
25	Runge–Kutta Method (fourth-order)
26	Runge–Kutta Method (fourth-order)
27	Runge–Kutta Method (fourth-order)
28	Runge–Kutta Method (fourth-order)

Syllabus		
Unit	Contents	Contact Hours
I	Methods for Solving Algebraic and Transcendental Equations Rate and order of convergence; Bisection method, Method of false position, Fixed point iteration method, Newton's method, and Secant method, their order of convergence and convergence analysis.	12
II	Techniques to Solve Linear Systems and Interpolation LU decomposition and its applications; Iterative methods: Gauss–Jacobi, Gauss–Seidel methods; Lagrange and Newton interpolation, Piecewise linear interpolation.	15
III	Numerical Differentiation and Integration First and higher order approximation for the first derivative, Approximation for the second derivative; Numerical integration by closed Newton–Cotes formulae: Trapezoidal rule, Simpson's rule and its error analysis; Euler's method to solve ODE's, Modified Euler method, Runge–Kutta Method (fourth-order).	18
	Total	45

Text Books/Suggested Readings:

S. No.	Name of Authors/Books/Publishers	Year of Publication/ Reprint
1.	Bradie, Brian. A Friendly Introduction to Numerical Analysis. Pearson Education India. Dorling Kindersley (India) Pvt. Ltd. Third impression 2011.	2006
2.	Gerald, Curtis F., & Wheatley, Patrick O. Applied Numerical Analysis (7th ed.). Pearson Education. India.	2007
3.	Jain, M. K., Iyengar, S. R. K., & Jain, R. K. Numerical Methods for Scientific and Engineering Computation. (6th ed.). New Age International Publisher, India, 2016.	2012

Paper Components			
Credits	Lecture (L)	Tutorial (T)	Practical (P)
4	3	0	1
Assessment Scheme			
S.No.	Component	Marking Scheme	Total Marks
1	Internal Assessment <ul style="list-style-type: none"> ● Assignment/Quiz/Project/Presentation ● Class Test ● Attendance 	12 12 6	30
3.	Practical <ul style="list-style-type: none"> ● Continuous Assessment ● End Term Written/Practical Exam ● Viva 	NA NA NA	NA
4.	End Semester Examination		90