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
	13	Lagrange interpolation
	14	Lagrange interpolation
Unit III	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**	**Contac t 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/ Repr int**
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 ● Assignment/Quiz/Project/ Presentation ● Class Test ● Attendance	 12 12 6	**30**
3.	Practical ● Continuous Assessment ● End Term Written/Practical Exam ● Viva	 NA NA NA	NA
4.	End Semester Examination		90