



Indraprastha College for Women

University of Delhi

Course Name:	B.Sc.(H)
Paper Title:	Numerical Analysis
Unique Paper Code:	
Semester:	IV
Faculty(s):	Dr Manju Sharma
Year:	2024

Work Plan			
Unit No.	Learning Objective	Lecture No.	Topics to be Covered
I	<p>Learning Objectives: The main objective of this course is to introduce:</p> <ul style="list-style-type: none"> ● Various computational techniques to find approximate value for possible root(s) of algebraic and non-algebraic equations. ● Methods to solve system of linear equations and ordinary differential equations. ● The use of computer algebra system (CAS) by which the numerical problems can be solved both numerically and analytically, and to enhance the problem-solving skills. 	1	Rate and order of convergence
		2	Rate and order of convergence
		3	Bisection method
		4	Method of false position
		5	Fixed point iteration method
		6	Fixed point iteration method
		7	Newton's method, Secant method
		8	Newton's method, Secant method
		9	Question based on Newton's method, Secant method
		10	Question based on Newton's method, Secant method
		11	Order of convergence and convergence analysis.
		12	Order of convergence and convergence analysis.

III	<p>Learning Objectives: The main objective of this course is to introduce:</p> <ul style="list-style-type: none"> • Various computational techniques to find approximate value for possible root(s) of algebraic and non-algebraic equations. • Methods to solve system of linear equations and ordinary differential equations. • The use of computer algebra system (CAS) by which the numerical problems can be solved both numerically and analytically, and to enhance the problem-solving skills. 	1	Numerical Differentiation and Integration First and higher order approximation for the first derivative, Approximation for the second derivative;
		2	Numerical Differentiation and Integration First and higher order approximation for the first derivative, Approximation for the second derivative;
		3	Numerical Differentiation and Integration First and higher order approximation for the first derivative, Approximation for the second derivative
		4	Numerical Differentiation and Integration First and higher order approximation for the first derivative, Approximation for the second derivative
		5	Numerical integration by closed Newton–Cotes formulae
		6	Numerical integration by closed Newton–Cotes formulae
		7	Trapezoidal rule
		8	Simpson's rule and its error analysis;
		9	Simpson's rule and its error analysis;
		10	Simpson's rule and its error analysis;
		11	Euler's method to solve ODE's
		12	Euler's method to solve ODE's
		13	Euler's method to solve ODE's
		14	Modified Euler method
		15	Modified Euler method
		16	Runge–Kutta Method (fourth-order)
		17	Runge–Kutta Method (fourth-order)
		18	Runge–Kutta Method (fourth-order)

Syllabus		
Unit	Contents	Contact Hours
I	Methods for Solving Algebraic and Transcendental Equations (hours) 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	Sharing with other faculty	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	30
Text Books/Suggested Readings:		
S. No.	Name of Authors/Books/Publishers	Year of Publication/ Reprint
1.	Bradie, Brian. (2006). A Friendly Introduction to Numerical Analysis. Pearson Education India. Dorling Kindersley (India) Pvt. Ltd. Third impression 2011.	2006
2.		
3.		
4.		

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 	0	25
2.	Continuous Assessment (Tutorial) <ul style="list-style-type: none"> • Activity 1 • Activity 2 • Attendance 	NA NA NA NA	NA
3.	Practical <ul style="list-style-type: none"> • Continuous Assessment • End Term Written/Practical Exam • Viva 		50
4.	End Semester Examination		75

