

Department of Liberal Education Era University, Lucknow Course Outline Effective From: 2023-24

Name of the	B.A. / B.Sc. (LIBERAL EDUCATION)			Year/ Semester:	2 nd / 4 th		
Course	Numerical Analysis Course MT202		Type:	Theory			
Name	- ····································	Code:		- , por	i neor y		
Credits	(05		Total Sessions Hours:	75 Hours		
Evaluation	Internal	50 Marks		End Term Exam:	50 Marks		
Spread	Continuous						
	Assessment:						
Type of Course	C Compulsory	Ore		C Creative	O Life Skill		
Course Objectives	The objective of this course is to provide conceptual understanding of various numerical methods, in particular, with reference to numerical solution of nonlinear equations and system of linear equations, interpolation, numerical differentiation and integration and numerical solution of ordinary differential equations. Important theorems and different formulae for various numerical methods to be covered with an aim of helping the students to understand the fundamentals, concepts and practical use of these methods in the field of computer sciences and applications.						
Course Outc	comes (CO): After	the succes	sful course	e completion, learners w	vill develo	op following	
Course							
Outcome			At	tributes			
(CO)							
CO1	Using appropriate numerical methods, determine the solutions to given non-linear						
	equations.						
CO2	Using appropriate numerical methods, determine approximate solutions to linear equations.						
CO3	Using appropriate numerical methods, determine approximate solutions to systems of ordinary equations.						
CO4	Demonstrate the use of interpolation methods to find intermediate values in given graphical and/or tabulated data.						
Pedagogy	Interactive, discussion-bases, student-centered, presentation.						
Internal	Mid-term Examination: 20 Marks						
Evaluation	Activity: 10 Marks						
Mode	Class test: 05 Marks Online Test/Objective Test: 05 Method						
	Assignments/Presentation: 05 Marks						
	Attendance: 05 Marks						
Session	Topic Hours Mapped						
Details							
Unit 1	Error: Machine	epsilon, a	bsolute, <mark>r</mark>	elative and percentage	<mark>20</mark>	CO1	
	errors, , General er	ror formu	la.				
	Algebraic and	Transcer	ndental	Equations: Bisection			
	method, Iteration	method,	False posi	tion method, Newton-			
	Raphson method,	Ramanuja	n's Metho	d, Iterative method for			
	solution of syster	n of equa	ations, Jac	cobi and Gauss-Seidel			
	method.						

		Activity: To find the the root of non-linear equation.												
Unit 2	2	Finite Differences and Interpolation: Introduction, Difference operator, Difference tables, Factorial polynomials, Summation of series. Newton's forward and backward differences, Lagrange's interpolation, Newton's divided difference formula for unequal interval, Gauss's Interpolation formula, Starling formula. Bessel's formula for equal interval. Activity: Application based calculation using Interpolation formula.							tion, ials, vard ided ttion val. ation	20 CO4		204		
Unit 3	j.	Numerical Integration and differentiation: Introduction, Numerical differentiation, Numerical integration by Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Boole's and Weddle's rule.Activity: Find the maximum and minimum value using numerical differentiation methods.							20	C	CO2			
Unit 4		Solution of Differential Equations: Picard's method, Euler's method, modified Euler's method, Taylor's series method and Ranga-Kutta method for 2 nd and 4 th order. Activity:Assignment based on application of different method.15CO3												
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Recapitulation & Examination Pattern						
Internal Continuous Assesment:						
Component	Marks	Pattern				
Mid Semester	20	Section A: Contains 10 MCQs/Fill in the blanks/One Word				
		Answer/ True-False type of questions. Each question carries 0.5				
		mark.				
		Section B: Contains 07 descriptive questions out of which 05				
		questions are to be attempted. Each question carries 03 marks .				
Activity	10	Will be decided by subject teacher.				
Class Test	05	Contains 05 descriptive questions. Each question carries 01				
		mark.				
Online Test/ Objective Test	05	Contains 10 multiple choice questions. Each question carries 0.5				
		mark.				
Assignment/ Presentation	05	Assignment to be made on topics and instruction given by subject				
		teacher.				
Attendance	05	As per policy.				
Total Marks	50					

Course created by:

Dr. Sheeba Rizvi

Dr. Toukeer Khan

Approved by: Prof. Nadeem Ur Rahman

Iman

Signature:

Signature: