C. U. SHAH UNIVERSITY, WADHWAN CITY.

Faculty of: **Sciences & Life Sciences**
Course: **Bachelor of Science (Mathematics)**
Semester**: II**
Subject Code**:MAM204-1C**
Subject Name: **Numerical Analysis**

Sr. No	Category	Subject Code	Subject Name	Teaching hours/ Week			Credit hours	Credit Points	Evaluation Scheme/ Semester								
									Theory				Tutorial / Practical				Total
									Continuous and Comprehensive Evaluation		End Semester Exams		Internal Assessment		End Semester Exams		
				Th	Tu	Pr			Marks		Marks	Duration	Marks	Duration	Marks	Duration	
2	MAJOR-II	MAM204-1C	Numerical Analysis	3	-	2	5	4	10 10 05	Assignment MCQ Attendance	50	2	25	1	-	-	100

Course Objective :

The main objectives of this course are

- Find the Lagrange Interpolation Polynomial for any given set of points.
- Use finite differences for interpolation, differentiation, etc.

COURSE CONTENTS

Course Outline for Theory

UNIT	COURSE CONTENT	TEACHING HOURS
I	Error in calculation and calculus of finite differences, interpolation. Significant error, Relative error, Estimation of error, Application of error formula. Forward differences, Backward differences, Shift operator, Polynomial in factorial notation.	**15**
II	Interpolation: error in interpolation, Newton's forward and backward formula, Central difference, Gauss's forward and backward formula.	**15**
III	Stirling's interpolation formula, Bessel's and Everett's formulae, Lagrange's formula,Divided difference, Newton's divided difference formula, inverse interpolation, its application.	**15**

Course Outline for Practical

SR. NO	COURSE CONTENT	Lab Hours
1	Problems based on errors, Newton's forward, backward formula	30
2	Problems based on Gauss's forward, backward interpolation formula.	
3	Problems based on Sterling's formula, Bessel's formula, Laplace Everest's formula	
4	Problems based on Lagrange's formula, Newton's divided difference formula.	

TEACHING METHODOLOGY:
Conventional method (classroom blackboard teaching)
ICT Techniques
Teaching through the classroom
Variety of learning styles and tools (PowerPoint presentations, audio-visual resources, e-resources, seminars, workshops, models)

LEARNING OUTCOME:
After the successful completion of the course, students will be able to

- Analyse errors and have an understanding of error estimation.
- Be able to use polynomials in several ways to approximate both functions and data, and to match the type of polynomial approximation to a given type of problem.
- Be able to solve equations in one unknown real variable using iterative methods and to understand how long these methods take to converge to a solution.
- Derive formulas to approximate the derivative of a function at a point, and formulas to compute the definite integral of a function of one or more variables.
- Choose and apply any of several modern methods for solving systems of initial value problems based on properties of the problem.

Arrangement of lectures duration and practical session as per defined credit numbers:

Units	Lecture Duration (In Hrs.)		Calculation of Credits (In Numbers)		Total Lecture Duration	Credit Calculation
	Theory	Practical	Theory	Practical	Theory+ Practical	Theory+ Practical
Unit – 1	15	30	3	1	45+30	4
Unit – 2	15					
Unit – 3	15					
TOTAL	45	30	3	1	75	4

Evaluation:

Theory Marks	Practical Marks	Total Marks
75	**25**	**100**

REFERENCE BOOKS:

1. Numerical Analysis and Computational Procedures', **S.A. Moolah,***New Central Book Agency (P) Ltd., Calcutta.*
2. 'Elementary Numerical analysis', **S.S. Sastry,***Prentice Hall, New Delhi.*
3. 'Numerical mathematical analysis 6th edition', **Scarborough,***Oxford & IBH.*
4. 'Numerical analysis', **S.Kunz,***Mcgraw Hill Book New York.*
5. 'Numerical Analysis', **Richard Burden and J. Douglas Thomson,** *Cole Pub Co; 6th edition (December 24, 1996)*