C. U. SHAH UNIVERSITY, WADHWAN CITY.

Faculty of: **Sciences and Life Sciences**
Course: **Bachelor of Science (Chemistry)**
Semester**: I**
Subject Code**: MAE202-1C**
Subject Name: **Basic Mathematics I**

Sr. No	Category	Subject Code	Subject Name	Teaching hours/ Week			Credit hours	Credit Points	Evaluation Scheme/ Semester								Total
									Theory				Tutorial / Practical				
									Continuous and Comprehensive Evaluation		End Semester Exams		Internal Assessment		End Semester Exams		
				Th	Tu	Pr			Marks	Marks	Marks	Duration	Marks	Duration	Marks	Duration	
3	MINOR	MAE202-1C	Basic Mathematics I	3	-	2	5	4	10 10 05	Assignment Quiz Attendance	50	2	25	1	-	-	100

AIM

The main objectives of this course are

- The definitions of matrix and types of matrices.
- Algebra of matrices.
- Methods to solve system of linear equations.
- Eigen value and Eigen vectors of matrices.
- The basics of the Calculus: Limits, Derivatives, Geometry.

COURSE CONTENTS

Course Outline for Theory

UNIT	COURSE CONTENT	TEACHING HOURS
I	Introduction to Determinants and Matrices, different types of Matrices, theorems on matrices, elementary operations on matrices, Row Echelon & Reduced Row Echelon form of a Matrix, Solution of system of linear equations, solving system of linear equations simultaneously, Inverse of Matrix, Rank of Matrix, Matrix inversion using RRE form. Characteristic equation of a matrix and Cayley-Hamilton theorem and its use in finding inverse of matrix, Eigen value and Eigen vector of square matrices, eigenvalue of special type of matrices, Diagonalization of matrix.	15
II	Complex numbers, Polar form of complex number. De'Moivre's theorem, nth roots of a complex number, Fundamental theorem of algebra (statement only), Multiple roots and test for multiplicity.	15
III	Review of Limit, Continuity, Differentiability, Sandwich Theorem. Indeterminate forms: $\frac{0}{0}$, $\frac{\infty}{\infty}$, $0 \times \infty$, $\infty - \infty$, $0^0, \infty^0, 1^\infty$,Successive derivative, Higher order derivatives, n^{th} derivatives of standard form. Leibnitz's theorem and its applications. Roll's Mean Value Theorem, Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem and problems related to it.Taylor's Theorem (Without Proof), Maclaurin's Theorem (Without Proof), Taylor's and Maclaurin's infinite series expansions, expansions of	15

| | $e^x, \sin x, \cos x, (1+x)^n, \log(1+x)$ under proper conditions. | |

Course Outline for Practical

SR. NO	COURSE CONTENT
1	RE and RRE form and rank of a matrix, Inverse of a matrix
2	Problems based on eigen values and eigen vectors and Diagonalization
3	Cayley- Hamilton's Theorem and its applications.
4	Descarte's rule of sign, Relation between roots and coefficients.
5	Solution of cubic equations (Cardan's method), Solution of biquadratic equations (Ferarri's method)
6	Algebra of Complex numbers, De'Moivre's theorem.
7	L' Hospital's rule and exercises
8	Successive differentiation and Leibnitz's theorem
	Total Hours = 30

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
- Solve systems of linear equations.
- Manipulate matrix algebra and determinants.
- Evaluate Eigen values and Eigen vectors.
- Understand the concepts of complex numbers and some complex functions.

ARRANGEMENT OF LECTURE 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					
Unit – 2	15	30	3	1	45+30	4
Unit – 3	15					
TOTAL	**45**	**30**	**3**	**1**	**75**	**4**

EVALUATION

Theory Marks	Practical Marks	Total Marks
75	25	100

REFERENCE BOOKS

1. Advanced Engineering Mathematics', **E. Kreyszig**, *New Age International Publishing Co.*
2. 'Complex Variables and Applications', **R. V. Churchill, J. W. Brown**, *McGraw-Hill Book Co.*
3. Elementary Linear Algebra', **Howard Anton and Chris Rorres**, *Wiley Pub.*
4. A Textbook of Matrices', **Shanti Narayan and P. K. Mittal**, *S. Chand and Co.* New Delhi.
5. 'Higher Engineering Mathematics, Thirty-fifth edition', **B. S. Grewal**, *Khanna Publication*.