



# C. U. SHAH UNIVERSITY, WADHWAN CITY.

Faculty of: **Sciences & Life Sciences**

Course: **Bachelor of Science (Mathematics)**

Semester: **I**

Subject Code: **MAM201-1C**

Subject Name: **Differentiation & Curve Theory**

Sr. No	Category	Subject Code	Subject Name	Teaching hours/ Week			Credit hours	Credit Points	Evaluation Scheme/ Semester								Total
				Th	Tu	Pr			Theory				Tutorial / Practical				
									Continuous and Comprehensive Evaluation		End Semester Exams		Internal Assessment		End Semester Exams		
									Marks	Marks	Marks	Duration	Marks	Duration	Marks	Duration	
1	MAJOR-I	MAM201-1C	Differentiation & Curve Theory	3	-	2	5	4	10	Assignment	50	2	25	1	-	-	100

## Course Objective :

The main objective of this course is to learn

- The basics of the Calculus: Limits, Derivatives, Geometry.
- Methods to solve system of linear equations.
- Methods to solve differential equations.

## COURSE CONTENTS

### Course Outline for Theory

UNIT	COURSE CONTENT	TEACHING HOURS
I	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, $n^{\text{th}}$ 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 $e^x, \sin x, \cos x, (1+x)^n, \log(1+x)$ under proper conditions.	15
II	Curve Tracing in Cartesian Coordinates using Symmetry, Intercepts, Asymptotes and Sign of the Function, Curve Tracing in Parametric Equations using Intercepts, Tangents parallel to axes, Asymptotes parallel to the axes, Oblique Asymptotes and Extent to the Curve; Equations of Tangent and Normal to the Curve at a given point.	15
III	First order and First-degree differential equations: basic concepts, Homogeneous and non-Homogeneous Equations, Exact differential equations, Integrating factors, Linear differential equations, Bernoulli equations, Differential equations of the first order and higher degree: Solvable for p, for x and for y, Clairaut's form of differential equations and Lagrange's form of differential equations.	15

## Course Outline for Practical

SR. NO	COURSE CONTENT	Lab Hours
1	L' Hospital's rule and exercises	30
2	Successive differentiation and Leibnitz's theorem	
3	Sketching of Cartesian curve, Parametric curves, Polar curves and reciprocal curves	
4	Relation between Cartesian, polar, spherical and cylindrical coordinates.	
5	Problems on solution of ODE of order 1 and degree 1-I (Separable variables, homogeneous and non-homogeneous )	
6	Problems on solution of ODE of order 1 and degree 1-II (Linear, Bernoulli and exact ODE )	
7	Problems on solution of ODE of order 1 and degree n	

### 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

- Graphing and optimization of the functions.
- Imagine three dimensional objects virtually.
- Analyze differential equations.
- Solve first ODES.
- Solve systems of linear equations.

### 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					
<b>TOTAL</b>	<b>45</b>	<b>30</b>	<b>3</b>	<b>1</b>	<b>75</b>	<b>4</b>

Evaluation:

Theory Marks	Practical Marks	Total Marks
75	25	100

## REFERENCE BOOKS:

1. Analytical solid Geometry', **Shanti Narayan and P. K. Mittal**, *S. Chand and Co.* New Delhi.
2. 'Differential Calculus', **Shanti Narayan and P. K. Mittal**, *S. Chand and Co.* New Delhi.
3. Higher Engineering Mathematics, Thirty-fifth edition', **B. S. Grewal**, *Khanna Publication*.
4. 'The calculus with analytic geometry', **Louis Leithod**, *Harper-Collins Pub.*
5. 'The Elements of Co-ordinate Geometry', **S. L. Loney**, *Mac Milan & Co.*
6. 'A Textbook of Analytical Geometry of three dimensions', **P. K. Jain**, *New Age International*.
7. 'Elementary Treatise on Co-ordinate Geometry of three dimensions', **R. J. T. Bell**, *Mac Milan Co.*
8. 'Advanced Engineering Mathematics', **E. Kreyszig**, *New Age International Publishing Co.*