



# C. U. SHAH UNIVERSITY, WADHWAN CITY.

Faculty of: **Sciences & Life Sciences**

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

Semester: **II**

Subject Code: **MAM203-1C**

Subject Name: **Differential & Integral Calculus**

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	MAM203-1C	Differential & Integral Calculus	3	-	2	5	4	10	Assignment	50	2	25	1	-	-	100

## Course Objective :

The main objectives of this course are

- To identify Concave upwards and concave downwards functions
- To calculate Improper Integral using Beta – Gamma Functions.
- To learn partial differentiation.
- To identify maximum and minimum values using partial differentiation.
- To learn expansion of function using Taylor’s and Maclaurin’s series.

## COURSE CONTENTS

### Course Outline for Theory

UNIT	COURSE CONTENT	TEACHING HOURS
<b>I</b>	Differentiability, Chain rule, Partial derivatives of higher order, Condition for commutative property of variables in higher order partial derivatives, Derivatives of implicit functions. Euler’s theorem on partial derives of homogenous functions. Extremum of functions of several variables, Lagrange’s method of undetermined multipliers, Taylor’s and Maclaurin’s expansions for functions of several variables (Proof for cases of two variables only)	<b>15</b>
<b>II</b>	Increasing and decreasing functions, Concave upwards and concave downwards functions, Points of inflexion, Asymptotes ,Beta and Gamma functions, relation between Beta and Gamma functions, Duplication formula, Properties of Beta and Gamma functions.	<b>15</b>
<b>III</b>	Real functions of several variables, Their limit and continuity, (Repeated limits and limits in $R^2$ to be explained), Partial derivatives of functions of $n$ variable (For special case $n = 2$ notation, $D_{12}$ and $D_{21}$ to be explained)	<b>15</b>

## Course Outline for Practical

SR. NO	COURSE CONTENT	Lab Hours
1	Problems based on real functions of several variable, limit, continuity, Partial derivative.	30
2	Problems based on Euler's theorem on homogeneous function, Change of variable.	
3	Problems based on Taylor's expansion and Maxima-Minima for a function of two variable.	
4	Problems based on Beta, Gamma functions, concave downwards, upwards, points of inflection, asymptotes.	

### 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

- Identify Concave upwards and concave downwards functions
- Calculate Improper Integral and partial differentiation
- Use partial differentiation in daily life.
- Identify maximum and minimum value of function.
- Apply Taylor's and Maclaurin's expansions in function of two variable

### 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. 'Differential Calculus', **Shanti Narayan & P. K. Mittal**, *S. Chand*.
2. 'Integral Calculus', **Shanti Narayan & P. K. Mittal**, *S. Chand*.
3. 'Advanced Calculus', **David Widder**, *Prentice hall, New Delhi*.
4. 'Advanced Calculus Volume-II', **T. M. Apostol**, *Blaisdoll*.
5. 'Partial Differential Equation', **T. Amarnath**, *Narosa*.
6. 'Calculus', **James Stewart**, *Brooks/Cole publishing company*.
7. 'Applied Calculus', **S. T. Tan**, *Brooks/Cole publishing company*