

**Unit - I****Chapter 1 : Partial Fractions 1-1 to 1-15**

1.1	Introduction	1-1
1.1.1	Polynomial	1-1
1.1.2	Rational Fraction.....	1-1
1.2	Proper and Improper Fraction.....	1-1
1.2.1	Proper Fractions	1-1
1.2.2	Improper Fractions.....	1-2
1.3	Cases of Partial Fractions.....	1-2
1.3.1	Case - I : When the Denominator Contains Non-Repeated Linear Factors.....	1-2
1.3.2	Solved Examples Based on the Denominator Contains Non Repeated Linear Factors	1-2
1.3.3	Case II : When the Denominator Contains Repeated Linear Factors	1-7
1.3.4	Solved Examples Based on the Denominator Contains Repeated Linear Factors	1-7
1.3.5	Case III : When the Denominator Contains Non Repeated Irreducible Quadratic Factor	1-10
1.3.6	Solved Examples Based on the Denominator Contains Non Repeated Irreducible Quadratic Factor	1-10
1.4	Application of Partial Fraction in Chemical Kinetics and Pharmacokinetics	1-13

Chapter 2 : Logarithms 2-1 to 2-12

2.1	Introduction	2-1
2.1.1	Definition	2-1
2.2	Some Important Formulae used to Understand the Exponential Form.....	2-1
2.3	Basic Properties of Logarithm	2-1
2.4	Types of Logarithm.....	2-1
2.5	Theorem/Properties of Logarithm.....	2-2

2.6	Characteristics and Mantissa	2-2
2.7	Solved Examples	2-2
2.8	Examples on Logarithm.....	2-3
2.9	Application of Logarithm in Pharmaceutical Problem	2-9
2.9.1	To Calculate Half Life Period.....	2-9
2.9.2	To Calculate the pH.....	2-10
2.9.3	To Calculate the Growth or Decay	2-10

Chapter 3 : Function 3-1 to 3-8

3.1	Introduction.....	3-1
3.1.1	Some Important Definitions.....	3-1
3.1.2	Function.....	3-2
3.2	Types of Functions	3-2
3.3	Solved Examples	3-3
3.4	Examples based on Odd and Even Function	3-7

Chapter 4 : Limits and Continuity 4-1 to 4-8

4.1	Introduction.....	4-1
4.2	Existence of Limits.....	4-1
4.2.1	Uniqueness of Limit.....	4-2
4.3	Properties of Limits	4-2
4.4	Substitution.....	4-2
4.5	List of Standard Important Formulae	4-2
4.6	Solved Examples	4-2

Unit - II**Chapter 5 : Matrices and Determinant 5-1 to 5-40**

5.1	Introduction.....	5-1
5.2	Definition.....	5-1
5.3	Types of Matrices	5-1



5.4	Operation on Matrices	5-4
5.4.1	Addition.....	5-4
5.4.2	Subtraction.....	5-5
5.4.3	Equality of Matrices	5-5
5.4.4	Multiplication of Matrices	5-6
5.4.5	Illustrative Examples	5-7
5.4.6	Examples Based on Multiplication of Matrices.....	5-8
5.4.7	Transpose of a Matrix.....	5-14
5.4.8	Orthogonal Matrix.....	5-15
5.4.9	Determinant of a Matrix	5-18
5.5	Properties of Determinants.....	5-20
5.6	Product of Determinants	5-21
5.7	Minors and Cofactors	5-22
5.8	Cramer's Rule	5-22
5.8.1	For a System of Equations in two Variables x and y	5-22
5.8.2	For a System of Equations in 3 Variables x, y, z.....	5-23
5.9	Minor of an Element.....	5-28
5.9.1	Cofactor of an Element.....	5-29
5.9.2	Adjoint of a Matrix	5-29
5.9.3	Solved Examples.....	5-30
5.9.4	Inverse of a Matrix by Adjoint Method ...	5-31
5.10	Solution of Simultaneous Equations by Matrix Inversion Method	5-33
5.11	Steps to Solve the System	5-33

5.12	Cayley - Hamilton Theorem	5-36
5.13	Application of Matrices in Solving Pharmacokinetic Equations	5-38

Unit - III

Chapter 6 : Calculus	6-1 to 6-33
-----------------------------	--------------------

6.1	Introduction.....	6-1
6.2	Definition of Derivative	6-1
6.3	Derivatives of Standard Functions	6-1
6.3.1	Constant Function	6-1
6.3.2	Power Function	6-2
6.3.3	Exponential Function	6-2
6.3.4	Logarithmic Function	6-2
6.3.5	Trigonometric Functions by using First Principle	6-3
6.3.6	Derivatives of Inverse Trigonometric Functions.....	6-5
6.4	Derivatives of Some Standard Functions ..	6-5
6.5	Rules of Differentiation	6-6
6.5.1	Derivative of Sum	6-6
6.5.2	Derivative of Difference	6-6
6.5.3	Solved Examples	6-6
6.5.4	Derivative of Product.....	6-8
6.5.5	Derivative of Quotient	6-10
6.5.6	Derivatives of a Composite Functions (Chain Rule).....	6-12
6.6	Composite Derivatives.....	6-12
6.7	Derivatives of Inverse Trigonometric Functions by Suitable Substitution	6-16
6.8	Derivatives of Implicit Functions.....	6-18
6.9	Logarithmic Differentiation	6-19
6.10	Derivatives of Parametric Functions	6-24



6.11	Second Order Differentiation.....	6-26
6.12	Condition for a Function to be a Maximum or a Minimum at a Point-Application	6-27
6.12.1	Maxima and Minima	6-27

Unit - IV

Chapter 7 : Analytical Geometry 7-1 to 7-13

7.1	Introduction to Signs of the Co-ordinates	7-1
7.2	Distance Formula	7-1
7.3	Straight Line.....	7-5
7.3.1	Introduction	7-5
7.4	Slope (Gradient) of a Line	7-5
7.5	Different Forms of the Equation of a Straight Line	7-6
7.5.1	The Slope Point Form of a Line	7-6
7.5.2	Line Parallel to X-axis.....	7-6
7.5.3	Line Parallel to Y-axis.....	7-6
7.5.4	The Slope-intercept Form of a Line	7-6
7.5.4(A)	Solved Examples.....	7-7
7.5.5	The Two-point Form of a Line.....	7-8
7.6	Intercepts of a Line on the Axes	7-9
7.6.1	Solved Examples.....	7-9
7.7	Angle between Two Lines.....	7-10
7.8	Condition for Parallel Lines and Perpendicular Lines	7-10

Chapter 8 : Integration 8-1 to 8-48

8.1	Integration	8-1
8.1.1	Indefinite Integral	8-1
8.1.2	Integration of Standard Function.....	8-1
8.2	Rules of Integration.....	8-2
8.3	Solved Examples on Simple Integration ..	8-2

8.4	Integration of Composite Function	8-5
8.5	Integration by Trigonometric Transformation	8-6
8.6	Integration by Substitution Method	8-12
8.6.1	Some Substitutions	8-12
8.7	Solved Examples	8-12
8.8	Integration by Partial Fraction.....	8-18
8.9	Integration by Parts.....	8-22
8.10	Definite Integral.....	8-27
8.11	Some Properties of Definite Integral	8-27
8.11.1	Solved Examples	8-28
8.12	Problems on Property of Definite Integration	8-33
8.13	Definite Integral by Method of Substitution	8-35
8.14	Integration by Parts.....	8-37
8.14.1	Solved Examples	8-37
8.15	Application of Definite Integral	8-38
8.16	Area under the Curve as a Definite Integral	8-39
8.16.1	Solved Examples	8-39
8.17	Area between Two Curves	8-44
8.17.1	Solved Examples	8-45

Unit - V

Chapter 9 : Differential Equations 9-1 to 9-22

9.1	Introduction.....	9-1
-----	-------------------	-----



9.2	Order and Degree of a Differential Equation 9-1	10.5	Laplace Transform of an Integral of Form $\left(\int_0^t f(u) du \right)$ 10-3
9.2.1	Solved Examples 9-1	10.6	Trigonometric Identities 10-3
9.3	Variable Separable Form 9-3	10.6.1	Solved Examples 10-3
9.3.1	Solved Examples 9-3	10.7	Examples based on First Shifting Theorem 10-7
9.4	Homogenous Differential Equation 9-6	10.8	Inverse Laplace Transform 10-11
9.5	Exact Differential Equation 9-10	10.9	Properties of Inverse Laplace Transform 10-12
9.6	Linear Differential Equation 9-15	10.10	Inverse Laplace Transform by Partial Fractions 10-16
9.7	Application in Solving Pharmacokinetic Equations 9-20	10.11	Solutions of Differential Equation by Laplace Transform Method 10-19
Chapter 10 : Laplace Transform 10-1 to 10-29		10.12	Application of Laplace Transform in Solving Chemical Kinetics and Pharmacokinetics 10-24
10.1	Introduction 10-1	10.13	Application of Laplace Transform in Solving Chemical Kinetics and Pharmacokinetics for Oral Dose Administration 10-26
10.2	Condition for Existence of Laplace Transform 10-1		
10.3	Laplace Transform of Some Standard Functions 10-1		
10.4	Some Properties of Laplace Transform ... 10-2		