

SES's L.S. RAHEJA COLLEGE OF ARTS AND COMMERCE(AUTONOMOUS)



BOARD OF STUDIES: Department of Mathematics, Statistics and
Computer

PROGRAMME: Bachelor of Science (Information Technology)

SEMESTER: IV

NOMENCLATURE OF THE COURSE: Applied Mathematics

NEP Vertical: Minor

Credit: 02

(As Per Choice Based Credit System (under NEP 2020) with effect from the
academic year 2025-26)



Programme:	Bachelor of Science (Information Technology)
Nomenclature of the Course	Applied Mathematics
Total Marks	50
Semester:	IV
Academic year	2025-26

LEARNING OBJECTIVES:

1. Apply the knowledge of matrices to solve the problems.
2. Ability to interpret the mathematical results in physical or practical terms for complex numbers.
3. Solve and analyze the Partial derivatives and its application in related field of engineering

COURSE OUTCOMES:

1. Familiar with the various forms and operations of a complex number.
2. Solve the matrix operations, identify the linear dependence and independence of a vectors.
3. Find the Laplace transform of a function and Inverse Laplace transform of a function using definition also solve ordinary differential equations using Laplace transform.

Unit	Course Content	Andragogy	No of Lectures
I	<p>1.1 Matrices: Inverse of a matrix, Properties of matrices, Elementary Transformation, Rank of Matrix, Echelon or Normal Matrix, Inverse of matrix, Linear equations, Linear dependence and linear independence of vectors, Linear transformation, Characteristics roots and characteristics vectors, Properties of characteristic vectors, Caley-Hamilton Theorem, Similarity of matrices, Reduction of matrix to a diagonal matrix which has elements as characteristics values.</p> <p>1.2 Complex Numbers: Complex number, Equality of complex numbers, Graphical representation of complex number(Argand's Diagram), Polar form of complex numbers, Polar form of $x+iy$ for different signs of x,y, Exponential form of complex numbers, Mathematical operation with complex numbers and their representation on Argand's Diagram, Circular functions of complex angles, Definition of hyperbolic function, Relations between circular and hyperbolic functions, Inverse hyperbolic functions, Differentiation and Integration, Graphs of the hyperbolic functions, Logarithms of complex quality, $j(=i)$ as an operator(Electrical circuits)</p>	<ul style="list-style-type: none"> • Give students problems: Provide problems for students to solve independently or in groups. • Focus on practical applications: Present knowledge and abilities in terms of their practical uses. • Use real-life examples: Incorporate real life examples into lessons. • Consider self-concept: Give adults autonomy over their learning so they can thrive on self-direction 	<p>7</p> <p>8</p>

	1.3 Equation of the first order and of the first degree: Separation of variables, Equations homogeneous in x and y, Non-homogeneous linear equations, Exact differential Equation, Integrating Factor, Linear Equation and equation reducible to this form, Method of substitution..		
II	<p>2.1 The Laplace Transform: Introduction, Definition of the Laplace Transform, Table of Elementary Laplace Transforms, Theorems on Important Properties of Laplace Transformation, First Shifting Theorem, Second Shifting Theorem, The Convolution Theorem, Laplace Transform of an Integral, Laplace Transform of Derivatives</p> <p>2.2 Inverse Laplace Transform: Shifting Theorem, Partial fraction Methods, Use of Convolution Theorem, Solution of Ordinary Linear Differential Equations with Constant Coefficients, Solution of Simultaneous Ordinary Differential Equations, Laplace Transformation of Special Function, Periodic Functions, Heaviside Unit Step Function, Dirac-delta Function(Unit Impulse Function)</p> <p>2.3 Multiple Integrals: Double Integral, Change of the order of the integration, Double integral in polar co-ordinates, Triple integrals.</p>	<ul style="list-style-type: none"> • Give students problems: Provide problems for students to solve independently or in groups. • Focus on practical applications: Present knowledge and abilities in terms of their practical uses. • Use real-life examples: Incorporate real life examples into lessons. • Consider self-concept: Give adults autonomy over their learning so they can thrive on self-direction 	<p>5</p> <p>5</p> <p>5</p>

SUGGESTED READINGS

1. P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Vol I, Pune Vidyathi Graha
2. P. N. Wartikar and J. N. Wartikar, Applied Mathematics II, Pune Vidyathi Graha
3. Dr. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications

QUESTION PAPER PATTERN

(A) FOR CONTINUOUS EVALUATION

RUBRICS FOR CONTINUOUS EVALUATION

Total : 20 marks

Presentation	10 Marks
Assignment ,Class Participation	10 Marks

(B) QUESTION PAPER PATTERN FOR SEMESTER END EXAMINATION

Total : 30marks

Q1 Answer any three out of the following Four questions (based on Module I) $5*3=15$

Q2 Answer any three out of the following Four questions (Based on Module II) $5*3=15$