GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Computer Applications

Level: Under Graduate

Course / Subject Code:

Course / Subject Name: Mathematics -1

w. e. f. Academic Year:	June-2024
Semester:	1
Category of the Course:	Multidisciplinary Course

Prerequisite:	Students must have a basic mathematical understanding of basic algebra, arithmetic, introductory geometry, graphs, and logical reasoning studied up to 12th standard
Rationale:	This course is crucial for an undergraduate program in Computer Applications, as it provides essential mathematical foundations that underpin key concepts in computer science and information technology. Set theory, functions, matrices, and coordinate geometry are integral to understanding and developing algorithms, data structures, and various computational applications. For instance, set theory is fundamental to database management and algorithm design, while functions and their properties are central to programming and data transformations. Matrices are pivotal in areas such as computer graphics, cryptography, and machine learning, and coordinate geometry is vital for rendering graphics and spatial data analysis. By mastering these mathematical concepts, students gain the tools needed for practical applications in algorithm design, database management, computer graphics, and cryptography. This course also prepares students for advanced topics in computer science, such as data structures, machine learning, and software development. Integrating theoretical knowledge with practical applications ensures that students are well-equipped to tackle complex computational problems and innovate in the dynamic field of computer science and information technology.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Demonstrate proficiency in performing and analyzing set operations, applying properties of set operations, and utilizing Venn diagrams to solve practical problems.	AP
02	Define, represent, and analyze various functions, including exponential, logarithmic, and trigonometric functions, using appropriate graphs and properties.	AP
03	Execute matrix arithmetic, determine the properties of determinants, and apply these concepts to solve linear equations using Cramer's rule and matrix inversion methods.	AP

04	Apply coordinate geometry principles to analyze and solve problems involving distances, areas, and equations of lines, including understanding the relationships between parallel and perpendicular lines.	AP

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
4	0	0	4	70	30	-	-	100

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Set Theory:** • Concept of Set Theory • Methods of representation of Set • Types and operations of Set operations (Union, Intersection, Complement of a set, Difference of sets, Symmetric difference, Cartesian product of sets) • Properties of set operations (Commutative, Associative, Distributive, De- Morgan's laws) • Power set and Cardinality of sets. • Venn Diagram • Practical Applications of Set theory	14	25
2.	**Functions:** • Introduction and Definition of Function • Domain, Co-domain, and Range of a function • Graph of a functions • Types of Functions (Linear, Quadratic, Polynomial, Implicit and - Explicit functions and examples related with it) • Exponential and Logarithmic with their properties and related examples, Introduction to Trigonometric functions.	14	25
3.	**Matrix and Determinant:** • Definition of Matrix • Types of Matrices (Square, Row, Column, Zero, Diagonal, Scalar, Identity, Transpose, Symmetric, Skew – symmetric)	14	25

	• Arithmetic operations of Matrices (Addition, Scalar Multiplication, Matrix Multiplication) • Introduction to Determinants • Invertible matrix • Matrix inversion using adjoint matrix method • Derive solution of set of Linear equations for 2 variables using Cramer's – Rule • Row and column operation on Matrix • Rank of Matrix		
4.	**Co-ordinate Geometry:** • Introduction to Co-ordinates • Quadrants and Lines • Distance formula in R^2 (without proof) • Section Formula (without proof) • Area of a triangle (without proof) and related examples • General Equation of a Straight line • Slope and intercepts of a line • Parallel Lines • Perpendicular Lines • Angle between two lines (without proof) and related examples	14	25
	Total	**56**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	**20**	**70**	**-**	**-**	**-**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Business Mathematics by D C Sancheti and V K Kapoor, S. Chand and Sons Publication, Publication Year 2011
2. Business Mathematics by J K Singh, 3rd Edition, Himalaya Publication
3. A Textbook of Business Mathematics by Padmalochan Hazarika, 4th Edition, S. Chand and Sons Publication

4. Engineering Mathematics by Anthony Croft, Robert Davison, Martin Hargreaves; 5th Edition; Pearson Publication

(b) Open source software and website:

1. SciLAB is an excellent opensource software for mathematics simulation and solution. It can be downloaded from https://www.scilab.org/

CO- PO Mapping:

Semester ___	Course Name : Mathematics-1											
	POs											
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	2	-	-	2	-	-	-	-	-
CO2	2	3	3	2	-	-	1	-	-	-	-	-
CO3	2	3	3	3	-	-	2	-	-	-	-	-
CO4	1	3	3	3	-	-	2	-	-	-	-	-

Legend: '3' for high, '2' for medium, '1' for low and '-' for *no correlation of each CO with PO.*

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