

# Kadi Sarva Vishwavidhyalaya, Gandhinagar

## BCA Semester I

### BCA108 – Part 3: Foundation Course

### Mathematics for Computer Science

#### Rationale:

To enhance logic by using basic concepts of mathematics such as Set-Theory, Matrix Operation

#### Prerequisites:

- No formal prerequisites but students are expected to be comfortable with mathematics.
- Fundamental knowledge of Mathematical operations
- Sound knowledge of BODMAS rule

#### Learning Outcomes:

- Develop analytical and problem solving skills.
- Compare the relevance between the introduced terminology and abstract ideas.
- Understanding the practical applications of mathematics in solving problems of commerce, management, engineering & economics.

#### Teaching and Evaluation Scheme:

Sub. Code	Sub. Type	Subject Title	Teaching Scheme		Exam Scheme				
			Cr.	Hrs. / Week	Theory		Practical		Total Marks
					Internal	External	Internal	External	
BCA 108	Foundation Course	Foundation in Mathematics	2	2	15	35	-	-	50

#### Course Content:

**Unit 1** (50%)

##### Objective:

To provide detailed idea of collection of similar types objects. To empower beginners logic through Predefined Sets, Arithmetic Operations on Sets (Graphically and Theoretically), and mathematical algebra using theorems of number of elements in a set. To facilitate learners ability to think conceptually

##### Set Theory:

Introduction, Definition and Concepts, Representation of Sets, Different types of Sets (Null Set, Singleton set, Finite set, Infinite set, Power set, Subset, Universal set, Equal set ), Set Operations using Venn diagram and examples : Union, Intersection, Difference, Symmetric Difference, Complement of Set, Laws of algebra of Set(Distributive, D' Morgan's) , Cartesian Product of Set, Cardinality of Set

##### Coverage of topics in Books:

Book 1: Chapter – 1 --- Page no. 1-36

Book 2: Chapter – 1 --- Page no. 1-28

**Application:**

One of the primary applications is database query design and processing. All queries onto RDBMS are in set notation and returned as sets. Data structures organize data in well-defined ways, (lists, trees, graph) is well defined sets. Higher languages uses and provides predefined sets liken (Tokens, Identifiers, Collections, Dataset, Hashset, List). Google search engine works based on sets of provided words.

**Unit 2:**

(50%)

**Objective:**

- To enhance idea of rectangular presentation of numbers;
- To study different arrangements in two dimensional array;
- To perform arithmetic operations using Matrices;
- To get solution of linear equations using Matrix

**Matrices:**

Introduction, Types of Matrices(Null matrix, Equal matrix, Row matrix, Column matrix, Square matrix, Transpose of matrix, Diagonal matrix, Scalar matrix, Unit matrix, Symmetric matrix, Skew Symmetric matrix, Orthogonal matrix), Operations on Matrices (Addition, Subtraction, Scalar, Multiplication), Computations of: Determinant, Adjoint and Inverse of a Matrix.

Solution of System of Linear Equations: Cramer's Rule, Gauss Elimination Method (2x2), Matrix Inverse Method.

**Coverage of topics in Books:**

Book 1: Chapter – 3 --- Page no. 84-124

Book 2: Chapter – 9 --- Page no. 292-306 and Chapter – 10 --- Page no. 324-385

**Applications:**

One of the primary applications is Computer Graphics; widely used in development of Computer Games; In Robotics and Kinematics matrices allow rotations, translations through planes to be easily calculated. Matrices are used in engineering, physics, computer science, and other applications of mathematics.

**Text Book:**

1. Advanced Mathematics:

Auther(s): Heena Timani Publication:

Publication: Books India

2. Business Mathematics:

Auther(s): Prof. H. R. Vyas, Dr. C. J. Trivedi, Prof. A. B. Savjani

Publication: B. S. Shah Prakashan

## Reference Books:

1. Discrete Mathematical Structure [3<sup>rd</sup> Ed.]:  
Auther(s): Bernard kolman, Robert C. Busby, Sharon Roass  
Publication: Prentice Hall Of India
2. The Essence Of Mathematics For Business :  
Auther(s): H.A.Spooner, D.A.L.Wilson  
Publication: Prentice Hall Of India.
3. Business Mathematics:  
Auther(s): J.K Singh  
Publication: Himalaya Publications
4. Financial Mathemetics:  
Auther(s): A. Lenin Jothi  
Publication: Himalaya Publications

## Instructional Strategies:

- Bridge course to sharpen the existing knowledge.
- Classroom teaching with variants to make mathematics easy to learn.
- Integrate topics and concepts.
- Independent Practice to develop the art of self learning.
- Demonstration using technology tools.
- Provide examples to transfer learning.
- Problem solving of relevant real time data.

## Question Paper Scheme:

University Examination	Duration: 1.5 Hours.	Total marks: 35
Q.1-Unit-I & II		(11 Marks)
Objective / Short Questions		
Q.2-Unit-I		(12 Marks)
Descriptive / Long questions		
Q.3-Unit-II		(12 Marks)
Descriptive / Long questions		

Note: Q.2 and Q.3 must have at least 40% Internal Options (i.e. Attempt Any 3 out of 5)

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