

**Uka Tarsadia University**



**B.C.A.**

**Mathematics for Computer Applications**

**(030010105)**

**1<sup>st</sup> Semester**

**EFFECTIVE FROM JUNE-2014**

UKA TARSADIA UNIVERSITY  
B.C.A. (1st Semester) Syllabus, 2014-2015

Course Code: 030010105

Course Title: Mathematics for Computer Applications

Course Credits: 4

Total Hours: 48

[Lectures: 04, Tutorial: 00, Practical: 00]

Prerequisites: NIL

Prerequisites By Topics: NIL

Objectives: To provide foundation of data representation, to understand its logical implementation and to teach mathematical concepts to understand their applications in computer domain.

- 1 **Data Representation & Binary Mathematics** [08 Hours]
  - 1.1. Representation of Characters in Computers
  - 1.2. Representation of Integers and Fractions, Hexadecimal Representation of Number
  - 1.3. Decimal to Binary Conversion, Binary addition and Subtraction
  - 1.4. Signed Number & Two Complement Representation of Numbers
  - 1.5. Addition/Subtraction of Numbers in 2's Complement Notation
  - 1.6. Binary Multiplication and Division
  - 1.7. Floating Point Representation of Numbers and Arithmetic Operation with Normalized Floating Point Numbers
- 2 **Mathematical Logic** [08 Hours]
  - 2.1. Basic of Mathematical Logic
  - 2.2. Normal Forms
  - 2.3. Indirect Method of Proof
  - 2.4. Automatic Theorem Proving
  - 2.5. Quantifiers
- 3 **Set Theory** [08Hours]
  - 3.1. Basic of Set Theory
  - 3.2. Relations
  - 3.3. Hasse Diagram
  - 3.4. Function
  - 3.5. Binary Operation
  - 3.6. Recursive Function and Lattice
- 4 **Elementary Combinatorics** [08 Hours]
  - 4.1. Introduction, Basic Counting Principle
  - 4.2. Permutation and Combination
  - 4.3. Pigeonhole Principle
  - 4.4. Mathematical Induction
  - 4.5. Recurrence Relation
  - 4.6. Generating Function
- 5 **Analytical Geometry** [08 Hours]
  - 5.1. Introduction, Regular Cartesian Coordinate System
  - 5.2. Distance Formula
  - 5.3. Line and Slope Formula
  - 5.4. Area
  - 5.5. Angle Between The Two Lines
- 6 **Determinants** [08 Hours]
  - 6.1. Introduction, Notation and Definition
  - 6.2. Properties of Determinants
  - 6.3. Cramer's Rule

**Course Outcomes:**

- C01: Convert decimal to binary, hexadecimal and 2's complement data representation, perform operations like addition, subtraction, division and multiplication.
- C02: Recognize mathematical notations and carry out technique of mathematical proof like indirect proof, automatic theorem proving, mathematical induction.
- C03: Use concepts of set theory for understanding & fetching data from database using query.
- C04: Discover permutations and combinations on given set of data.
- C05: Describe Cartesian coordinate system and implement different geometric formulas in calculation.
- C06: Solve system of linear equation by Cramer's rule.

### Course Objectives and Course Outcomes Mapping:

To provide foundation of data representation to understand its logical implementation: CO1, CO2, CO3

To teach mathematical concepts to understand its application in computer science: CO1, CO4, CO5, CO6, CO7, CO8.

### Course Units and Course Outcomes Mapping:

Unit No.	Unit	Course Outcome					
		CO1	CO2	CO3	CO4	CO5	CO6
1	Data Representation & Binary Mathematics	✓					
2	Mathematical Logic		✓				
3	Set Theory		✓	✓			
4	Elementary Combinatorics				✓		
5	Analytical Geometry					✓	✓
6	Determinants						✓

### Modes of Transaction (Delivery):

- ❖ Lecture method shall be used but along with it, as and when required, discussion method would be fruitful. It may be supplemented with various appropriate audio-visual aids.
- ❖ Self-assessment problem set should be designed after regular interval of two units and given to each student for solution.
- ❖ Tutorial may be used to solve students' queries.

### Activities/Practicum:

The following activities shall be carried out by the students.

- ❖ Collection of various thoughts/statements on subject representing various view points of topics.
- ❖ To identify application of set theory in DBMS.
- ❖ Implementation of Cramer's rule for solving system of linear equations.

The following activities shall be carried out by the teacher.

- ❖ Application of Logic and their application in Database management.
- ❖ Application of set theory and Matrix algebra in computer science.
- ❖ Relation of Matrix and data base.
- ❖ Application of Analytic Geometry in Computer Science.

### Text Book:

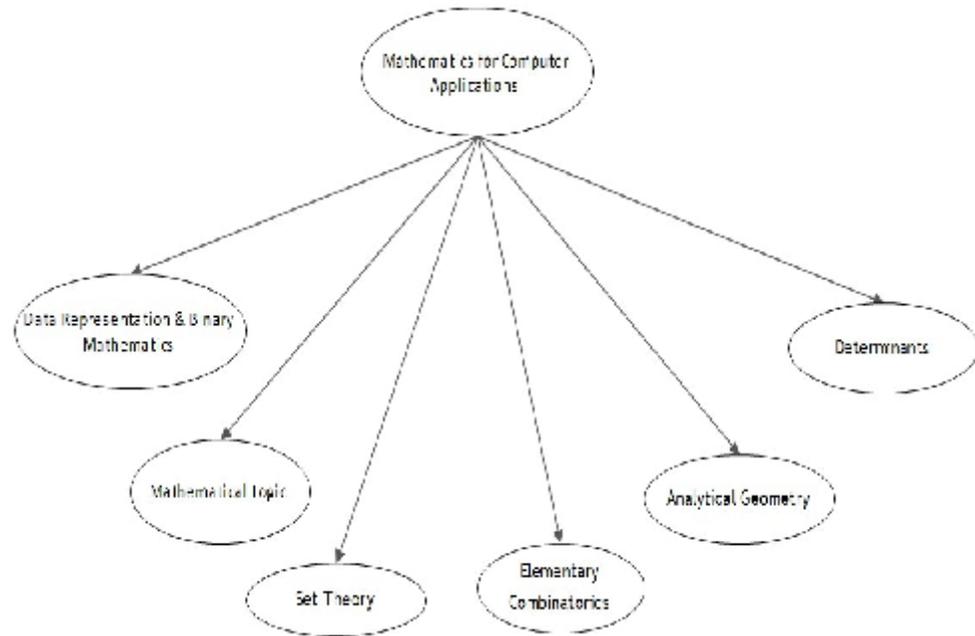
1. T. Veerarajan - Discrete Mathematics - Tata McGraw Hill.

### Reference Books:

1. H. R. Vyas - Mathematics for Management - B. S. Shah Prakashan
2. Kevin Ferland - Discrete Mathematical Structure - Cengage Learning India Private Ltd.
3. Rosen - Discrete Mathematics and its Applications - PHI
4. G.S.S. Bhishma Rao - Mathematical Foundation of Computer Science - Scitech publication (India) Pvt. Ltd.
5. P. K. Sinha - Computer Fundamentals - BPB Publication

### Concept Map:

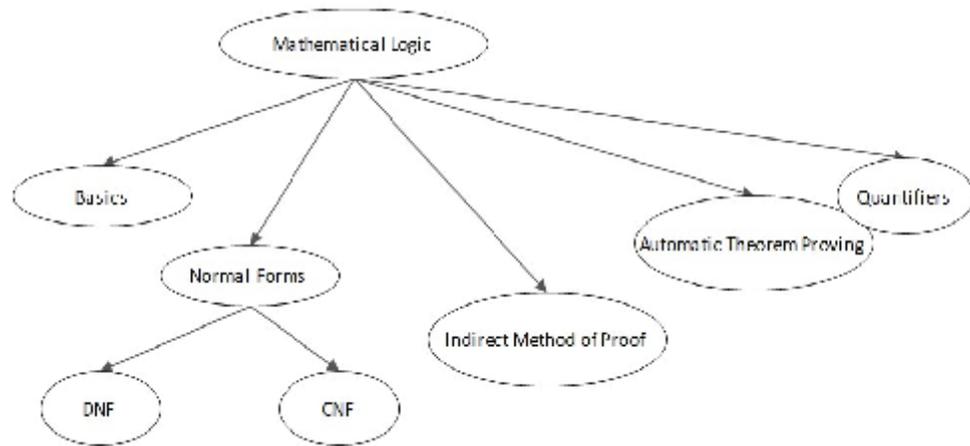
Mathematics for Computer Applications



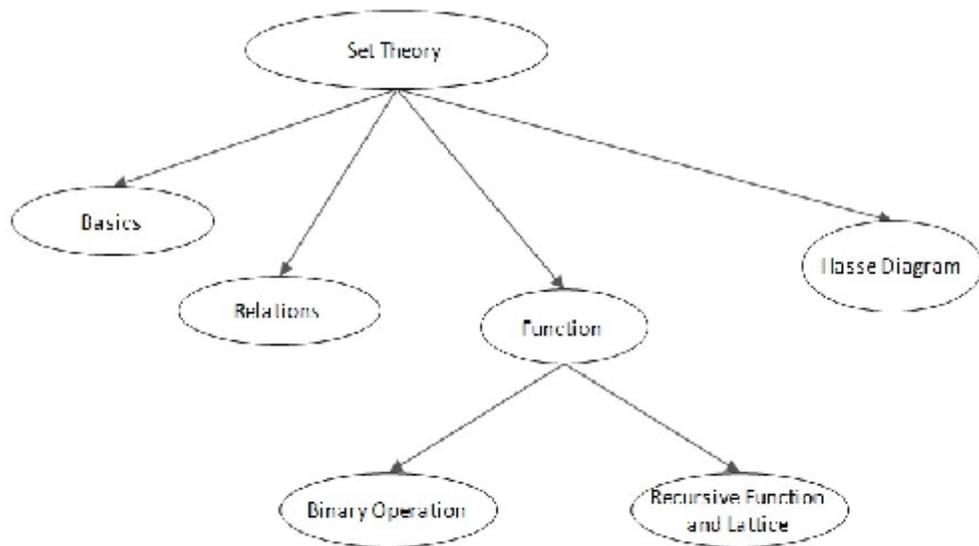
Unit-1: Data Representation & Binary Mathematics



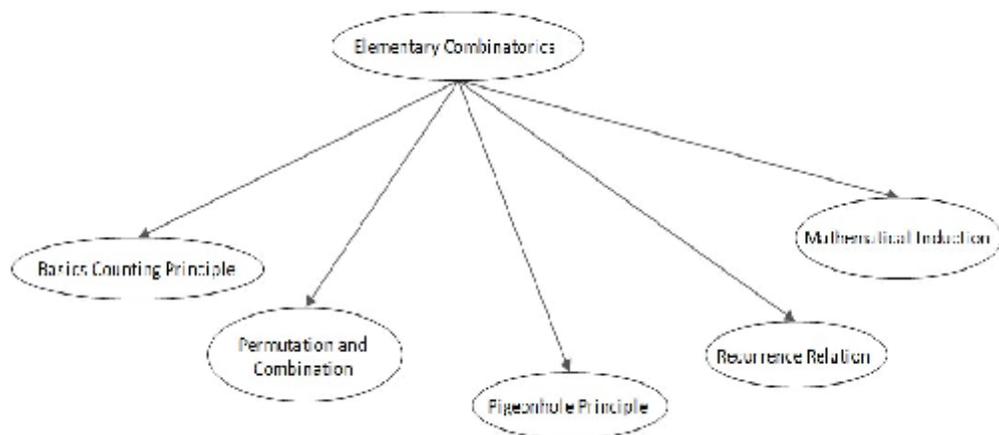
Unit-2: Mathematical Logic



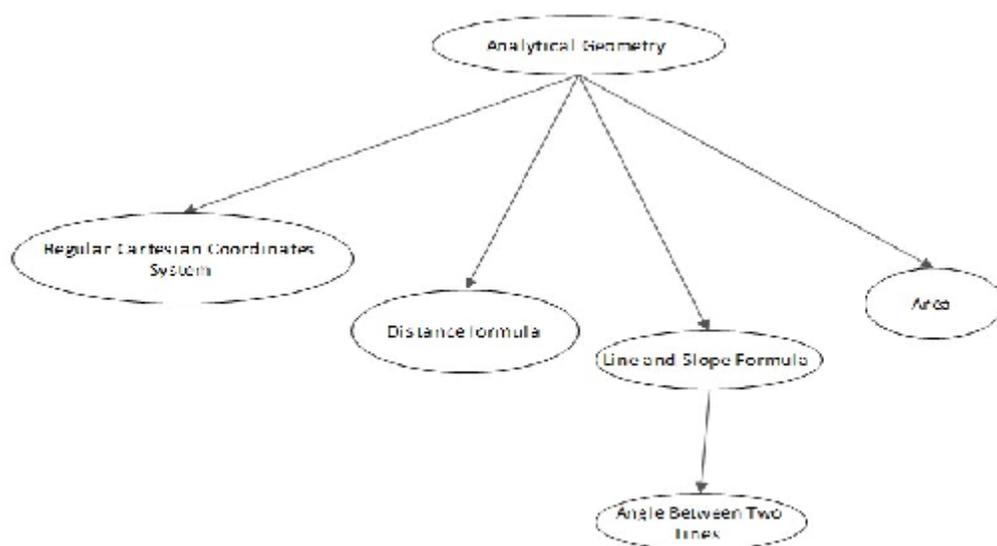
Unit-3: Set Theory



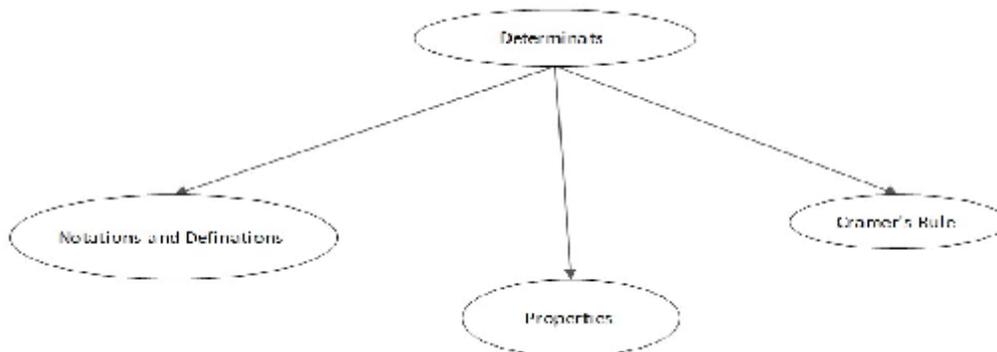
Unit-4: Elementary Combinatorics



Unit-5: Analytical Geometry



### Unit-6: Determinants



### Assessment:

The weightage of CIE and University examination shall be as per the University regulations.  
Composition of CIE shall be

Assessment Code	Assessment Type	Duration of each	Occurrence	Each of marks	Weightage in CIE of 40 marks	Remarks
A1	Internal	3 Hours	1	60	$15 \times 1 = 15$	Cover all the units
A2	Unit Test	1.5 Hours	2	30	$6 \times 2 = 12$	Cover Units 2,3,5,6(Including major topics such as binary operation, Hasse diagram and determinates)
A3	Quiz	45 Minutes	2	20	$4 \times 2 = 8$	Cover units 1 and 4(Including major topics such as representation of characters, permutation and combination)
A4	Assignment	-	1	20	$5 \times 1 = 5$	Maximum five examples from each unit will be given to solve, it shall be submitted at the end of the semester.

- ❖ Syllabus for each CIE parameter shall be covered by the date of the corresponding test.
- ❖ No make-up work shall be accepted for missed or failed tests.

- ❖ Student shall receive up to 10% penalty of full marks(20 Marks) on 2 days late submission, after 2 days student will get 50% penalty of full marks and zero marks if no submission.

### Course Assessment with Course Outcomes Mapping

Assessment	Course Outcomes					
	CO1	CO2	CO3	CO4	CO5	CO6
A1	✓	✓	✓	✓	✓	✓
A2		✓	✓		✓	✓
A3	✓			✓		
A4	✓	✓	✓	✓	✓	✓

### Question Bank:

Question Bank shall consist of Multiple Choice Questions, Fill in the blanks, Short type questions, long type questions and comprehensive exercises. Comprehensive exercises shall be applicable for units 1, 2, 3, 5 and 6.

### Academic Honesty:

Coursework is assumed to be accomplished individually (otherwise stated). Any portion of submission taken directly from anywhere (like statements in assignment/report etc.) without modification shall be accompanied with the properly formatted reference giving credit to the author and to the source.

### UFM:

- ❖ If two or more submitted papers are too similar for coincidence, a penalty shall be imposed that shall usually be the same for the student who did the original as for the one copying from it.
- ❖ Any ascertained fact of breaking institute policy shall be associated with one or all of the following: (i) zero marks for the work; (ii) report to the Course coordinator; (iii) report to the Director.

### Discussion Group:

Students are welcome to post on the Course Discussion Board available on SRIMCA View Course Webpage. It is responsibility of the concern Course teacher to maintain Discussion Board.

### Attendance:

- ❖ Attendance means being present for the entire class session. Those arriving significant late or leaving significantly early without prior permission shall be counted as ABSENT for the entire class session.
- ❖ Concern teacher must clearly state his/her attendance policies at the first class meeting.