Paper: 1 / Subject: Mathematics for Computer Science-I
(Discrete Mathematics-I)

Credits 3 **Total Hrs/Week: 3**

1. **Mathematical Logic**
   - 1.1. Statements & Notations
   - 1.2. Connectives
     - 1.2.1. Negation
     - 1.2.2. Conjunction
     - 1.2.3. Disjunction
     - 1.2.4. Truth Tables
     - 1.2.5. Well-formed Formula
   - 1.3. Normal Forms
     - 1.3.1. Disjunctive Normal Forms
     - 1.3.2. Conjunctive Normal Forms
     - 1.3.3. Principal Disjunctive & Conjunctive Normal Forms

2. **Theory of Inference for Statement Calculus**
   - 2.1. Validity using Truth Table
   - 2.2. Rules of Inference
   - 2.3. Consistency of Premises & Indirect Method of Proof

3. **Predicate Calculus**
   - 3.1. Predicates
   - 3.2. The Statement Function, Variables & Quantifiers
   - 3.3. Predicate Formula
   - 3.4. Free & Bound Variables
   - 3.5. Inference Theory of Predicate Calculus
     - 3.5.1. Valid Formulas & Calculus
     - 3.5.2. Theory of Inference for Predicate Calculus

Reference Books:

1. Discrete Mathematical Structures with Application to Computer Science, J P Tremblay & R Manohar, TMH
2. Foundations of Discrete Mathematics, by K. D Joshi, Wiley Eastern Limited.
3. Discrete Mathematics, by Harikishan, Shivraj Pundir, Sandeep Kumar, Pragati Prakashan,Meerut.
4. Discrete Mathematics for Computer Scientists & Mathematicians, by Joe L Mott, Abraham Kandel, Theodore P Baker Prentice Hall of India Pvt. Limited
5. Discrete Mathematical structuctures, by Bernard Kolman, Robert C Busby, Sharon Ross, Prentice- Hall of India.
6. A Text Book of Discrete Mathematics; Swapan Kumar Sarkar, S.chand

Paper: 2 / Subject: Mathematics for Computer Science-II
(Calculus - I)

Credits 3 **Total Hrs/Week: 3**

1. Limit and Continuity of functions

1.1 Definition of function
1.2 Single valued and multiple valued functions (illustrate with examples)
1.3 Monotonic functions
1.4 Types of functions (algebraic function, Transcendental functions)
1.5 Limit of a function
1.6 Right and left hand limits of rational algebraic functions
1.7 Continuity of a function

2. Derivative

2.1 Definition,
2.2 Derivative of constant function
2.3 Derivative of trigonometric function
2.4 Derivative of logarithmic function
2.5 n^{th} derivative of the functions $(ax+ b)^m$, $1/(ax+b)^m$, e^{mx+c}, a^{mx+c}, sin(ax+b), cos(ax+b), log(ax+b)
2.6 n^{th} derivative of rational functions

3. Integration

3.1 Integration of functions by substitution and by parts
3.2 Definite integration
3.3 Properties of definite integration and their applications

Reference Books:

1. Shantinarayan : Differential & Integral Calculus, S. Chand & Co. New Delhi.
2. Gorakhprasad : Differential Calculus, Pothishala Pvt. Ltd., Allahabad.
3. M. R. Spiegel : Theory and Problems of Advanced Calculus, Schaum's Publishing Co., N Y
4. Shantinarayan : Integral Calculus, S. Chand & Co., New Delhi.
5. Gorakhprasad : Integral Calculus, Pothishala Pvt. Ltd., Allahabad .

Paper: 3 / Subject: Subject: Mathematics for Computer Science-III
(Discrete Mathematics-II)

Credits 3 **Total Hrs/Week: 3**

1. **Basic Concept of Set Theory**
   - 1.1. Notations
   - 1.2. Inclusion & Equality of Sets
   - 1.3. The Power Set
   - 1.4. Operation on Sets
   - 1.5. Venn Diagrams
   - 1.6. Ordered Pair & n-tuples
   - 1.7. Cartesian Products

2. **Relations & Ordering**
   - 2.1. Relations
   - 2.2. Properties of Binary Relations in a Set
   - 2.3. Equivalence Relations
   - 2.4. Partial Ordering
   - 2.5. Partially Ordered Sets

3. **Lattices & Boolean Algebra**
   - 3.1. Lattices
     - 3.1.1. Lattices as Partially Ordered Sets
     - 3.1.2. Properties of Lattices
     - 3.1.3. Lattices as Algebraic Systems
     - 3.1.4. Some Special Lattices: Bounded Lattice, Complimented Lattice & Distributive Lattice
   - 3.2. Boolean Algebra
     - 3.2.1. Definition & Examples
     - 3.2.2. Sub-Algebra, Direct Product

Reference Books:

1. Discrete Mathematical Structures with Application to Computer Science, J P Tremblay & R Manohar, TMH
2. Foundations of Discrete Mathematics, by K. D Joshi, Wiley Eastern Limited.
3. Discrete Mathematics, by Harikishan, Shivraj Pundir, Sandeep Kumar, Pragati Prakashan,Meerut.
4. Discrete Mathematics for Computer Scientists & Mathematicians, by Joe L Mott, Abraham Kandel, Theodore P Baker Prentice Hall of India Pvt. Limited
5. Discrete Mathematical Structures, by Bernard Kolman, Robert C Busby, Sharon Ross, Prentice- Hall of India.

Paper: 4 / Subject: Subject: Mathematics for Computer Science-IV
(Theory of Matrices)

Credits 3 **Total Hrs/Week: 3**

1. **Introduction**
   - 1.1. Introduction of Matrices
   - 1.2. Different types of Matrices
   - 1.3. Operations on Matrices
   - 1.4. Properties of Matrices
   - 1.5. Adjoint of a Matrix
   - 1.6. Inverse of a Matrix

2. **Row Operations of Matrix**
   - 2.1. Elementary Row Operations
   - 2.2. Row-Reduced Echelon Form
   - 2.3. Linear Independence of Rows
   - 2.4. Row Rank
   - 2.5. Rank of a Matrix
   - 2.6. Inverse of Matrix by Row-Reduced Echelon Form

3. **Solution of System of Linear Equations using Matrix**
   - 2.1. Equivalent System of Linear Equations
   - 2.2. Solving a System of Homogenous & Non-Homogenous Linear Equations using Row-Reduced Echelon Form

Reference Books:

1. An Introduction to Linear Algebra, Krishnamurthy, Mainra & Arora, Affiliated East-West Press Pvt. Ltd., New Delhi
2. Text Book of Matrices, Santinarayan, S. Chand & Co.
3. Matrices; J.N.Kapur and M.K. Singal, R.Chand & Co., 1996.