Introduction to Programming (30%)

1 Functions:

- Definition and purpose of functions
- Function declaration and definition
- Parameter passing (by value, by reference)
- Return types and return statements
- Function overloading and default arguments
- Scope and lifetime of variables
- Recursive functions

2 Arrays and Strings:

- **Single-dimensional arrays:**
  - Declaration, initialization, and access
  - Array traversal and manipulation
- **Multi-dimensional arrays:**
  - Declaration, initialization, and access
- **String handling:**
  - String declaration and initialization
  - String functions (length, concatenation, comparison, substring)

3 Object-Oriented Programming (OOP) Concepts:

- **Introduction to OOP:**
  - Advantages of OOP over procedural programming
  - Basic concepts (class, object, method, message passing)
- **Principles of OOP:**
  - Encapsulation and data hiding
  - Inheritance and types of inheritance
  - Polymorphism (method overloading and overriding)
  - Abstraction
- **Constructors and destructors:**
  - Purpose and types of constructors
  - Destructor usage

4 Basic Algorithms:

- **Searching algorithms:**
  - Linear search
  - Binary search
- **Sorting algorithms:**
  - Bubble sort
  - Selection sort
  - Insertion sort

Communication Techniques (20%)

1 Basic Communication Skills:

- Elements of communication
- Communication process and barriers
- Types of communication (verbal, non-verbal, written)
- Effective public speaking and presentation skills

2 Technical Writing:

- Characteristics of technical writing
- Structure of technical documents (reports, manuals, research papers)
- Writing styles and conventions
- Use of graphics and visuals in technical documents
- Editing and proofreading techniques

3 Interpersonal Communication:

- Importance of interpersonal communication in a professional setting
- Techniques for effective team communication and collaboration

4 Communication Tools:

- Writing business correspondence (memos, letters, email)
- Virtual Communication Platforms (Slack, Teams, Zoom)
- Social media and its role in professional communication

5 Professional Communication:

- Preparing for job interviews (resume writing, interview techniques)

Mathematical Foundation of Computer Science (30%)

1 Discrete Mathematics:

- **Propositional and predicate logic:**
  - Logical connectives and truth tables
  - Logical equivalences and implications
  - Predicates and quantifiers
- **Proof techniques:**
  - Direct proof, indirect proof
  - Proof by contradiction
  - Mathematical induction
- **Graph Algorithms:**
  - Breadth-first search (BFS)
  - Dijkstra's algorithm for shortest paths

– Kruskal's and Prim's algorithms for minimum spanning trees

- **Principles:**
  - Pigeonhole principle
  - Inclusion-exclusion principle

2 Probability and Statistics:

- **Basic probability concepts:**
  - Sample space and events
  - Conditional probability and Bayes' theorem

- **Discrete and continuous distributions:**
  - Binomial distribution
  - Normal distribution
  - Poisson's distribution

- **Statistical measures:**
  - Measures of central tendency (mean, median, mode)
  - Measures of dispersion (variance, standard deviation)

3 Linear Algebra:

- **Matrices and determinants:**
  - Matrix operations (addition, multiplication)
  - Determinants and inverses

- **Vector spaces:**
  - Definition and properties
  - Basis and dimension

- **Linear transformations:**
  - Definition and examples
  - Matrix representation of linear transformations

- **Eigenvalues and eigenvectors:**
  - Definition and calculation
  - Applications

Foundation of AI (20%)

1 Introduction to AI:

- Definition and scope of AI
- AI applications
- Trends and future directions in AI

2 Problem Solving and Search:

- **Problem-solving agents**
- **Uninformed search strategies:**
  - Breadth-first search (BFS)
  - Depth-first search (DFS)
  - Uniform cost search

3 Machine Learning Basics:

- **Types of machine learning:**
  - Supervised learning
  - Unsupervised learning
  - Reinforcement learning
- **Basic algorithms:**
  - Linear regression
  - Decision trees
  - Clustering (k-means, hierarchical clustering)

Final Result Criteria:

Categories	Percentage
Entrance Exam	50%
Statement of Purpose (SOP)	20%
Interview	20%
Academic Qualification	10%
Entrance Question type	Multiple Choice
Number of Questions	50
Exam Duration	1.5 hrs