

Gandaki University
Faculty of Science and Technology
Syllabus for MIT-AI Entrance Examination

Introduction to Programming (30 Percentage)

Topics:

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 Percentage)

Topics:

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 Percentage)

Topics:

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
- Breadth-first search (BFS)
- Dijkstra's algorithm for shortest paths
- Kruskal's and Prim's algorithms for minimum spanning trees
- 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 Percentage)

Topics:

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)