

Dr. Babasaheb Ambedkar Open University
Term End Examination July – 2026

Course	: BSCIT	Date	: 18/08/2026
Subject Code	: BSCIT-404	Time	: 03:00pm to 05:15pm
Subject Name	: Introduction to Algorithms	Duration	: 02.15 Hours
		Max. Marks	: 70

Section A

Answer the following (Attempt any three) (30)

1. Explain Merge Sort with a suitable example.
2. Explain the N-Queens Problem using Backtracking.
3. Explain Dynamic Programming and its general pattern.
4. Explain Depth-First Search (DFS) and its working.
5. Explain Dijkstra's Algorithm for finding shortest paths.

Section B

Answer the following (Attempt any four) (20)

1. State and explain the four components of a complete algorithm description.
2. Explain the Tower of Hanoi Problem.
3. Write a short note on Longest Increasing Subsequence.
4. Explain Huffman Codes and their basic purpose.
5. Differentiate between Adjacency List and Adjacency Matrix.
6. Explain the concept of Maximum Flow and Minimum Cut.

Section C

Part – A (Multiple Choice Questions) (10)

Q.1 Which sorting algorithm selects a pivot to divide the input into smaller parts?

- A) Merge Sort B) Quick Sort
C) Insertion Sort D) Selection Sort

Q.2 Which technique solves a problem by trying possible choices and abandoning a choice when it cannot lead to a valid solution?

- A) Backtracking B) Hashing
C) Indexing D) Buffering

Q.3 Which problem is concerned with finding a subset whose elements add up to a specified value?

- A) Stable Matching B) Subset Sum
C) Topological Sorting D) Matrix Multiplication

Q.4 Which technique avoids repeated computation by remembering previously computed results?

- A) Linear Search B) Memoization
C) Sequential Scan D) Random Selection

Q.5 Which greedy problem involves selecting a set of mutually compatible time intervals?

- A) Scheduling Classes B) Subset Sum
C) N-Queens D) Edit Distance

Q.6 Which data structure is used in the breadth-first variant of graph search?

- A) Stack
- B) Queue
- C) Array only
- D) Binary Search Tree

Q.7 Which ordering places every directed edge from an earlier vertex to a later vertex?

- A) Random Ordering
- B) Topological Ordering
- C) Circular Ordering
- D) Numerical Ordering

Q.8 Which algorithm constructs a Minimum Spanning Tree by considering edges in increasing order of weight?

- A) Kruskal's Algorithm
- B) Bellman-Ford Algorithm
- C) Floyd-Warshall Algorithm
- D) Quickselect Algorithm

Q.9 Which algorithm can compute single-source shortest paths even when some edge weights are negative?

- A) Prim's Algorithm
- B) Bellman-Ford Algorithm
- C) Huffman Algorithm
- D) Merge Sort

Q.10 Which term describes a problem that is both in NP and NP-hard?

- A) NP-Complete
- B) Linear
- C) Recursive
- D) Greedy

Part – B (State whether the following statements are true or false)

(10)

- 1 A complete description of an algorithm should include an analysis of its running time.
- 2 Every recursive problem can be solved without defining any base case.
- 3 A recursion tree can be used as a tool for analyzing recursive algorithms.
- 4 Dynamic programming is useful only when all subproblems are completely unrelated to each other.
- 5 A greedy algorithm generally builds a solution through a sequence of choices.
- 6 An undirected graph allows an edge to be traversed in only one specified direction.
- 7 Depth-First Search can be used to detect cycles in graphs.
- 8 Every spanning tree of a weighted graph necessarily has the same total weight.
- 9 A shortest path between two vertices must always contain the maximum possible number of edges.
- 10 A flow network contains capacities that restrict the amount of flow through its edges.
