DSA

QUIZ-4

TURING MACHINE

1. Which of the following statements is true about a deterministic Turing machine (DTM)?

   a) It can have multiple possible transitions from a given state on a given input symbol.

   b) It always halts on any input string.

   c) It can simulate the behavior of a non-deterministic Turing machine (NTM).

   d) It can only move the tape head to the right.

2. In a non-deterministic Turing machine (NTM), when faced with multiple choices at a given configuration, what does it do?

   a) It chooses the lexicographically smallest option.

   b) It chooses all possible options simultaneously.

   c) It stops and rejects the input.

   d) It asks the user for input.

P AND NP

3. Which of the following problems belong to the class P (Polynomial time)?

   a) Traveling Salesman Problem

   b) Factorization of large integers

   c) Finding the shortest path in a weighted graph

   d) Sorting a list of numbers

4. What does it mean for a problem to be in the class NP (Non-Polynomial time)?

   a) The problem cannot be solved.

   b) The problem can be solved in exponential time.

c) The problem can be verified in polynomial time.

d) The problem has no known solutions.

5. The class NP contains problems for which:

a) Solutions can be checked in polynomial time.

b) Solutions can be found in polynomial time.

c) Solutions cannot be checked.

d) Solutions are necessarily exponential.

6. Which of the following is an NP-complete problem?

a) Sorting a list of numbers

b) Traveling Salesman Problem

c) Finding the maximum element in an array

d) Calculating the factorial of a number

ANSWERS

1. Which of the following statements is true about a deterministic Turing machine (DTM)?

Answer: b) It always halts on any input string.

2. In a non-deterministic Turing machine (NTM), when faced with multiple choices at a given configuration, what does it do?

Answer: b) It chooses all possible options simultaneously.

3. Which of the following problems belong to the class P (Polynomial time)?

Answer: c) Finding the shortest path in a weighted graph

4. What does it mean for a problem to be in the class NP (Non-Polynomial time)?

Answer: c) The problem can be verified in polynomial time.

5. The class NP contains problems for which:

Answer: a) Solutions can be checked in polynomial time.

6. Which of the following is an NP-complete problem?

Answer: b) Traveling Salesman Problem