**Question 1:**

**What is the Traveling Salesman Problem (TSP)?**

* A) A problem of finding the longest route that visits each city exactly once.
* B) A problem of finding the shortest route that visits each city exactly once and returns to the starting city.
* C) A problem of finding the shortest path between two specific cities.
* D) A problem of finding the shortest path that visits only a subset of cities.

**Answer: B**

**Question 2:**

**What does TSP stand for?**

* A) Traveling Salesperson Problem
* B) Traveling Salesman Problem
* C) Traveling Saleswoman Problem
* D) Traveling Student Problem

**Answer: B**

**Question 3:**

**Which of the following statements about TSP is true?**

* A) It is an easy problem to solve for large numbers of cities.
* B) It is a type of optimization problem.
* C) It is a problem that cannot be represented graphically.
* D) It always has a unique solution.

**Answer: B**

**Question 4:**

**What is the output of the TSP?**

* A) The total number of cities visited.
* B) The shortest path that visits each city exactly once and returns to the starting city.
* C) The longest path that visits each city exactly once.
* D) The average distance between cities.

**Answer: B**

**Question 5:**

**Which algorithm guarantees an optimal solution for TSP but is impractical for large datasets due to its high time complexity?**

* A) Nearest Neighbor Algorithm
* B) Genetic Algorithm
* C) Simulated Annealing
* D) Brute-Force Algorithm

**Answer: D**

**Question 6:**

**In TSP, what is meant by a "tour"?**

* A) A path that visits each city exactly once.
* B) A path that visits each city exactly once and returns to the starting city.
* C) A path that visits some cities multiple times.
* D) A path that visits only one city.

**Answer: B**

**Question 7:**

**Which data structure is typically used to represent distances between cities in TSP?**

* A) Linked List
* B) Stack
* C) Adjacency Matrix
* D) Queue

**Answer: C**

**Question 8:**

**What is a common heuristic method used for TSP?**

* A) Dijkstra's Algorithm
* B) Bellman-Ford Algorithm
* C) Nearest Neighbor Algorithm
* D) Binary Search

**Answer: C**

**Question 9:**

**In Java, which class would you use to generate random numbers for initializing populations in heuristic algorithms like Genetic Algorithm?**

* A) java.lang.Math
* B) java.util.Scanner
* C) java.util.Random
* D) java.util.ArrayList

**Answer: C**

**Question 10:**

**Which of the following is NOT a common approach to solve TSP?**

* A) Brute-Force Search
* B) Nearest Neighbor Heuristic
* C) Genetic Algorithm
* D) Binary Search Tree

**Answer: D**

**Question 11:**

**Which of these algorithms can be used to find an approximate solution for TSP?**

* A) Brute-Force Algorithm
* B) Breadth-First Search
* C) Genetic Algorithm
* D) Depth-First Search

**Answer: C**

**Question 12:**

**What does the fitness function in a Genetic Algorithm for TSP evaluate?**

* A) The number of cities in the tour
* B) The shortest distance between two cities
* C) How close a given solution is to the optimal solution
* D) The number of possible solutions

**Answer: C**

**Question 13:**

**Which Java method can shuffle a list of cities to create a random initial population for a Genetic Algorithm?**

* A) Collections.shuffle()
* B) Arrays.sort()
* C) Collections.sort()
* D) Arrays.shuffle()

**Answer: A**

**Question 14:**

**Which crossover method is commonly used in Genetic Algorithms for TSP?**

* A) Single-point crossover
* B) Uniform crossover
* C) Partially Mapped Crossover (PMX)
* D) Multi-point crossover

**Answer: C**

**Question 15:**

**How many permutations of cities need to be checked in a brute-force solution to TSP for n cities?**

* A) n
* B) n^2
* C) n!
* D) 2^n

**Answer: C**

**Question 16:**

**Which Java interface is typically implemented to allow sorting of TSP solutions by their total cost?**

* A) Comparator
* B) Runnable
* C) Serializable
* D) Cloneable

**Answer: A**

**Question 17:**

**What is the role of the mutation operator in a Genetic Algorithm for TSP?**

* A) To combine two parent solutions
* B) To create new solutions by altering parts of a solution
* C) To evaluate the fitness of a solution
* D) To select the best solutions for the next generation

**Answer: B**

**Question 18:**

**Which Java class can be used to measure the execution time of a TSP algorithm?**

* A) java.util.Timer
* B) java.time.Duration
* C) java.time.Instant
* D) java.util.Date

**Answer: C**

**Question 19:**

**In the context of TSP, what is a heuristic method?**

* A) An exact algorithm that guarantees the optimal solution
* B) An approximation algorithm that finds a good but not necessarily optimal solution
* C) A brute-force search method
* D) A method that randomly generates solutions

**Answer: B**

**Question 20:**

**What is the typical input for a TSP problem in a Java program?**

* A) A list of city names
* B) A matrix representing distances between cities
* C) A list of coordinates of the cities
* D) A single integer representing the number of cities

**Answer: B**

**Question 21:**

**In a Java program, how can you create an instance of a Graph class for TSP?**

* A) Graph g = new Graph();
* B) Graph g = Graph.getInstance();
* C) Graph g = new Graph(n); (where n is the number of cities)
* D) Graph g = Graph.createGraph();

**Answer: C**

**Question 22:**

**Which algorithm guarantees an optimal solution for TSP but is impractical for large datasets due to its high time complexity?**

* A) Nearest Neighbor Algorithm
* B) Genetic Algorithm
* C) Simulated Annealing
* D) Brute-Force Algorithm

**Answer: D**

**Question 23:**

**What is the purpose of the Collections.min() method in the context of TSP?**

* A) To find the shortest path between two cities
* B) To find the minimum distance in the adjacency matrix
* C) To find the solution with the least total distance
* D) To initialize the population with minimum values

**Answer: C**

**Question 24:**

**What is the typical input for a TSP problem in a Java program?**

* A) A list of city names
* B) A matrix representing distances between cities
* C) A list of coordinates of the cities
* D) A single integer representing the number of cities

**Answer: B**