

35 Lecture - CS301

Important Mcqs

1. **Which of the following best describes the dynamic equivalence problem?**
- a) The problem of finding the minimum number of equivalence classes for a given set of elements.
 - b) The problem of efficiently maintaining equivalence relations under dynamic changes to a set of elements.
 - c) The problem of finding the maximum number of equivalence classes for a given set of elements.
 - d) The problem of determining the transitive closure of a given relation.

Answer: b

2. **Which data structure is commonly used to solve the dynamic equivalence problem?**
- a) Arrays
 - b) Linked lists
 - c) Binary search trees
 - d) Disjoint-set data structures

Answer: d

3. **What is the time complexity of finding the equivalence class of an element using a disjoint-set data structure?**
- a) $O(1)$
 - b) $O(\log n)$
 - c) $O(n)$
 - d) $O(n \log n)$

Answer: b

4. **Which operation is used to combine two equivalence classes into a single equivalence class in a disjoint-set data structure?**
- a) Make set
 - b) Find set
 - c) Union
 - d) Intersection

Answer: c

5. **Which of the following is not a step in the path compression technique used in disjoint-set data structures?**
- a) Traverse the path from the root to the node.
 - b) Set the parent of each node in the path to the root.
 - c) Set the rank of each node in the path to zero.
 - d) Update the rank of the root node.

Answer: c

6. Which of the following is an advantage of using a rank-based union technique in disjoint-set data structures?
- a) Reduced time complexity of the find operation
 - b) Reduced time complexity of the union operation
 - c) Reduced memory usage
 - d) Improved scalability

Answer: b

7. What is the time complexity of the union operation using a rank-based union technique in disjoint-set data structures?
- a) $O(1)$
 - b) $O(\log n)$
 - c) $O(n)$
 - d) $O(n \log n)$

Answer: b

8. Which of the following is not a modification to the standard disjoint-set data structure that can improve its performance?
- a) Path compression
 - b) Rank-based union
 - c) Weighted union
 - d) Node reordering

Answer: d

9. Which of the following statements is true about the dynamic equivalence problem?
- a) It can be solved efficiently using brute force algorithms.
 - b) It can only be solved using advanced data structures and algorithms.
 - c) It is a well-defined problem that has a unique solution.
 - d) It has no practical applications in computer science.

Answer: b

10. Which of the following areas of computer science does not involve solving the dynamic equivalence problem?
- a) Databases
 - b) Information retrieval
 - c) Natural language processing
 - d) Computer graphics

Answer: d