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