ADS CCEE Mock Test1

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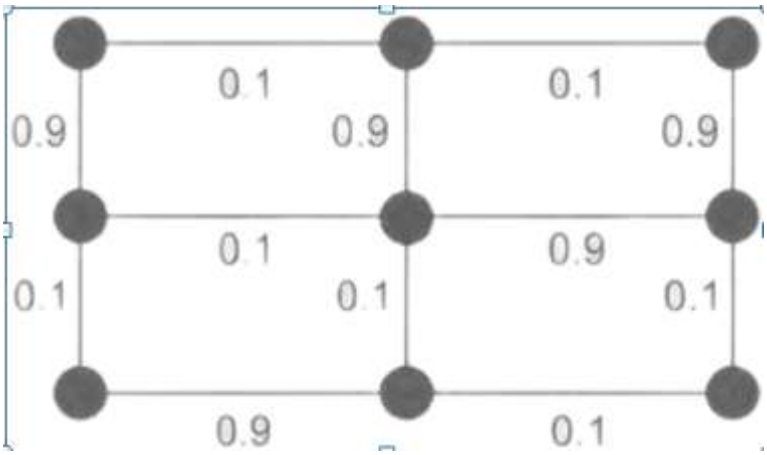
* Indicates required question

MCQ

Consider the following undirected graph with edge weights as shown: * 1 point

The number of minimum-weight spanning trees of the graph is ----



- 3
- 4
- 5
- 2

Which of the following is True about the Spanning Tree? * 1 point

- (●) A spanning is a minimal set of edges in a graph that contains no cycle, connects all the vertices
- ( ) A spanning is a maximal set of edges in a graph that connects all vertices.
- ( ) A Graph will have only one possible spanning tree
- ( ) None of the above

Which of the following algorithm solves the all-pair shortest path algorithm? * 1 point

- ( ) Prim's algorithm
- ( ) Dijkstra's algorithm
- ( ) Bellman-Ford algorithm
- (●) Floyd-Warshall's algorithm

Statement 1: When applying the Backtracking algorithm, all choices made can be undone when needed. * 1 point

Statement 2: When applying the Backtracking algorithm, the worst-case scenario is, that it exhaustively tries all paths, traversing the entire search space

- (●) Both, Statements 1 and 2, are true
- ( ) Statement 1 is true, Statement 2 is false
- ( ) Statement 2 is true, Statement 1 is false
- ( ) Both, Statements 1 and 2, are false

A hash function h defined h(key)=key mod 7, with linear probing, is used to insert the keys 44, 45, 79, 55, 91, 18, and 63 into a table indexed from 0 to 6. What will be the location of key 18? * 1 point

- [ ] 3
- [x] 4
- [ ] 5
- [ ] 6

Which one of the following is an application of Stack Data Structure? * 1 point

- [ ] Managing function calls
- [ ] The stock span problem
- [ ] Arithmetic expression evaluation
- [x] All of the above

The time required to search an element in a linked list of length n is * 1 point

- [ ] O(log n)
- [x] O(n)
- [ ] O(1)
- [ ] O(n2)

The integrity of transmitted data can be verified by using ..... * 1 point

- (●) Hash Message Authentication Code (HMAC)
- ( ) Timestamp comparison
- ( ) Data length comparison
- ( ) None of these

Consider the following sequence of operations on an empty stack indicated by **'S'**. * 1 point

Push(54);push(52);pop();push(55);push(62);s=pop();

Consider the following sequence of operations on an empty queue indicated by **'Q'**

enqueuer(21);

enqueuer(24);

dequeuer();

enqueuer(28);

enqueuer(32);

q=dequeuer();

The value of (**S+Q**) is --------

- ( ) 62
- ( ) 24
- (●) 86
- ( ) 68

Let G = (V, G) be a weighted undirected graph and let T be a Minimum Spanning Tree (MST) of G maintained using adjacency lists. Suppose a new weighed edge (u, v) ∈ V×V is added to G. The worst-case time complexity of determining if T is still an MST of the resultant graph is * 1 point

- (●) Θ(|E| + |V|)
- ( ) Θ(|E|.|V|)
- ( ) Θ(E| log |V|)
- ( ) Θ(|V|)

Suppose prevnode, p, nextnode are three consecutive nodes in a Doubly Linked List. Deletion of node p in this Doubly Linked List can be represented by which code snippet? * 1 point

[getPrev() method returns the prev node and getNext() method returns the next node in DLL.]

[SetPrev() method sets the prev node value and setNext() method sets the next node value in DLL.]

- ( ) p.getPrev().setPrev(p.getNext()); p.getNext().setNext(p.getPrev());
- ( ) p.getPrev().setNext(p.getPrev()); p.getNext().setPrev(p.getNext());
- (●) p.getNext().setPrev(p.getPrev()); p.getPrev().setNext(p.getNext());
- ( ) None of the above

We use a dynamic programming approach when * 1 point

- ( ) We need an optimal solution
- (●) The solution has an optimal substructure
- ( ) The given problem can be reduced to the 3-SAT problem
- ( ) It's faster than Greedy

Consider a binary max-heap implemented using an array. Which one of the following arrays represents a binary max-heap? * 1 point

- [ ] 25,12,16,13,10,8,14
- [ ] 25,14,16,13,10,8,12
- [ ] 25,16,12,13,10,8,14
- [x] 25,14,12,13,10,8,16

A complete n-ary tree is a tree in which each node has n children or no children. Let I be the number of internal nodes and L be the number of leaves in a complete n-ary tree. If L = 41, and I = 10, what is the value of n? * 1 point

- [ ] 6
- [ ] 3
- [x] 4
- [ ] 5

The recurrence relation capturing the optimal time of the Tower of Hanoi problem with n discs is.--- * 1 point

- [ ] T(n) = 2T(n-2)+2
- [ ] T(n) = 2T(n-1)+n
- [ ] T(n) = 2T(n/2)+1
- [x] T(n) = 2T(n-1)+1

Which is the safest method to choose a pivot element? * 1 point

- ○ Choosing a random element as a pivot
- ○ Choosing the first element as a pivot
- ○ Choosing the last element as a pivot
- ◉ Median-of-three partitioning method

Which of the following algorithm design techniques is used in finding all pairs of shortest distances in a graph (Warshall algorithms)? * 1 point

- ◉ Dynamic programming
- ○ Back Tracking
- ○ Greedy
- ○ Divide & Conquer

In which of the following tree do the height of the left subtree and the height of the right subtree differ at most by one? * 1 point

- ◉ AVL Tree
- ○ Expression Tree
- ○ Threaded Binary Tree
- ○ Binary Search Tree

Which of the following are not Associative Containers? * 1 point

- (●) priority queue
- ( ) map
- ( ) multimap
- ( ) multiset

The value returned by Hash Function is called as..... * 1 point

- ( ) Digest
- (●) Hash value
- ( ) Hash code
- ( ) All of these

What is a memory-efficient double-linked list? * 1 point

- (●) Each node has only one pointer to traverse the list back and forth
- ( ) The list has breakpoints for faster traversal
- ( ) An auxiliary singly linked list acts as a helper list to traverse through the doubly linked list
- ( ) None of the mentioned

A digraph is said to be COMPLETE, if it has N vertices and .....edges. * 1 point

- [ ] N*N
- [ ] N-1
- [x] N*(N-1)
- [ ] N*(N-1)/2

In the worst case, the number of comparisons needed to search a singly linked list of length n for a given element is * 1 point

- [x] O(log2 n)
- [ ] O(n/2)
- [ ] O(log2 n – 1)
- [ ] O(n)

If you want to store the name and marks of N students, which of the following is the correct choice? * 1 point

- [x] An array of structures that contains names and marks as a field.
- [ ] A structure containing arrays of Names and arrays of Marks
- [ ] An array of names and an Array of marks
- [ ] All of the above

What are the time complexities of finding the 8th element from the beginning and the 8th element from the end in a singly linked list? Let n be the number of nodes in a linked list, you may assume that n > 8. * 1 point

- (●) O(1) and O(n)
- ( ) O(1) and O(1)
- ( ) O(n) and O(1)
- ( ) O(n) and O(n)

Let ‘m’ and ‘n’ be the number of edges and vertices in a graph G, respectively. Which of the following is the time complexity of Kruskal's algorithm to find the minimum spanning tree of G? * 1 point

- ( ) O(n log n)
- (●) O(m log m)
- ( ) O(n2)
- ( ) O(m2)

Depth First Search graph traversal method makes use of ……. data structure. * 1 point

- ( ) Tree
- (●) Stack
- ( ) Queue
- ( ) Linked list

A tree node with no children is called a..... node. * 1 point

- (●) Leaf node
- ( ) Root node
- ( ) Parent node
- ( ) Ancestor node

Let A[1...n] be an array of n distinct numbers. If i < j and A[i] > A[j], then the pair (i, j) is called an inversion of A. What is the expected number of inversions in any permutation on n elements? * 1 point

- ( ) n(n-1)/2
- (●) n(n-1)/4
- ( ) n(n+1)/4
- ( ) 2n[logn]

What is the best method to go for the game-playing problem? * 1 point

- ( ) Optimal Search
- ( ) Random Search
- (●) Heuristic Search
- ( ) Stratified Search

Which of the following types of Linked List support forward and backward traversal? * 1 point

- ○ Singly Linked List
- ◉ Doubly Linked List
- ○ Circular Singly Linked List
- ○ All of these

In the worst case, the number of comparisons needed to search a singly linked list of length n for a given element is--- * 1 point

- ○ log2 n
- ○ n/2
- ○ log2 (n-1)
- ◉ n

Identify the correct sequence of the below actions for implementing decisions? * 1 point

I. Create an action plan

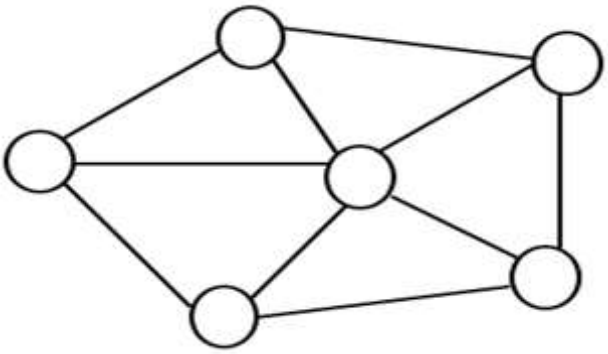
II. Prioritize actions and assign roles

III. Break solution into action steps

IV. Follow-up at milestones

- ○ I, III, II, IV
- ◉ I, II, III, IV
- ○ I, IV, II, III
- ○ IV, III, II, I

What would be the order in which edges are added to form a minimum spanning tree using Kruskal's and Prim's algorithms for the following graph: * 1 point



- (●) Kruskal's - AB CD CF AE FE and Prim's - AB AE FE CF CD
- ( ) Kruskal's - AB CD CF FE AE and Prim's – AB AE FE CF CD
- ( ) Kruskal's - AB CD CF FE AE and Prim's - AB AE FE CD CF
- ( ) Kruskal's – CD AB CF FE AE and Prim's - AB AE FE CF CD

Consider the following array. * 1 point

23,32,45,69,72,73,89,97

Which algorithm out of the following options uses the least number of comparisons (among the array elements) to sort the above array in ascending order?

- ( ) Selection sort
- (●) Merge sort
- ( ) Insertion sort
- ( ) Quicksort using the last element as a pivot

Which one of the following is the tightest upper bound that represents the time complexity of inserting an object into a binary search tree of n nodes? * 1 point

- O(1)
- O(logn)
- O(n)
- O(nlogn)

Let H be a binary min-heap consisting of n elements implemented as an array. What is the worst-case time complexity of an optimal algorithm to find the maximum element in H? * 1 point

- Θ(1)
- Θ(log n)
- Θ(n)
- Θ(n log n)

The height of a binary tree is the maximum number of edges in any root-to-leaf path. The maximum number of nodes in a binary tree of height h is: * 1 point

- 2^h -1
- 2^(h-1) – 1
- 2^(h+1) -1
- 2*(h+1)

The postfix equivalent of prefix expression * + a b – c d is * 1 point

- [x] a b + c d - *
- [ ] a b c d + - *
- [ ] a b + c d * -
- [ ] a b + - c d *

The worst-case time complexity for the linear search algorithm is.... * 1 point

- [x] O(n)
- [ ] O(log n)
- [ ] $O(n^2)$
- [ ] O(n log n)

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