Status	Finished
Started	Saturday, 22 February 2025, 8:50 AM
Completed	Saturday, 22 February 2025, 9:14 AM
Duration	23 mins 49 secs
Marks	18.00/20.00
Grade	**4.50** out of 5.00 (**90**%)

Question **1**

Correct

Mark 1.00 out of 1.00

Which of the following is NOT an advantage of a doubly linked list over a singly linked list?

a. Requires less memory per node ✓
b. Efficient deletion of a node from the middle
c. Ability to traverse in both directions
d. Easier to implement a deque (double-ended queue)

The correct answer is: Requires less memory per node

Question **2**

Correct

Mark 1.00 out of 1.00

A complete binary tree with n nodes is stored in an array. What is the parent index of a node stored at index i (1-based indexing)?

a. 2i + 1
b. i/2 ✓
c. (i-1)/2
d. 2i

The correct answer is: i/2

Question **3**

Correct

Mark 1.00 out of 1.00

State whether the following statement is true or false: N^2logN + N^2 = O(N^2).

a. True
b. False ✓

The correct answer is: False

Question **4**

Correct

Mark 1.00 out of 1.00

Consider the recurrence relation T(n) = 2T(n/2) + n. Using the Master Theorem, what is the time complexity of the algorithm?

- a. O(log n)
- b. O(n^2)
- c. O(n log n) ✓
- d. O(n)

The correct answer is: O(n log n)

Question **5**

Correct

Mark 1.00 out of 1.00

Which of the following data structures can be used to implement a priority queue efficiently?

- a. Hash Table
- b. Binary Heap ✓
- c. Linked List
- d. Array

The correct answer is: Binary Heap

Question **6**

Correct

Mark 1.00 out of 1.00

The running time of an algorithm is T(n) = T(n/3) + T(2n/3) + O(n). What is the time complexity?

- a. O(n^2 log n)
- b. O(n log n) ✓
- c. O(n^2)
- d. O(n)

The correct answer is: O(n log n)

Question **7**

Correct

Mark 1.00 out of 1.00

Algorithm A(n) {

if (n =2) return;

else return(A(root(n)));

}

Which recurrence relation represents the time complexity of this algorithm?

a. T(n) = a (if n = 2), = T(root(n)) + b (otherwise); where a and b are constants. ✓

b. T(n) = a (if n = 2), = T(n-1) + b (otherwise) ; where a and b are constants.

c. T(n) = a (if n = 2), = T(n-1) + root(n) (otherwise) ; where a and b are constants.

d. T(n) = a (if n = 2), = T(root(n)) + n (otherwise) ; where a and b are constants.

Your answer is correct.

The correct answer is:
T(n) = a (if n = 2), = T(root(n)) + b (otherwise); where a and b are constants.

Question **8**

Correct

Mark 1.00 out of 1.00

Deducing time complexity using master's theorem T(n) = 4T(n/2) + n^2

a. θ(n^2)

b. θ(n^2 logn) ✓

c. θ(n)

d. θ(nlogn)

The correct answer is: θ(n^2 logn)

Question **9**

Correct

Mark 1.00 out of 1.00

A circular queue is implemented using an array of size 10. The array index starts with 0, front is 6, and the rear is 9. The insertion of the next element takes place at the array index?

a. 7

b. 0 ✓

c. 9

d. 10

The correct answer is: 0

Question **10**

Correct

Mark 1.00 out of 1.00

Algorithm A, B have running time 7n^2 + 4n + 5 and 3n^2 respectively. Then in big theta approximation

a. None
b. A asymptotically beats B
c. B asymptotically beats A
d. Both have same complexity ✓

The correct answer is: Both have same complexity

Question **11**

Correct

Mark 1.00 out of 1.00

Give a tight asymptotic upper bound to the following recurrence T(n) = T(n/5) + log^2n.

a. θ(log^3 n) ✓
b. θ(√n)
c. θ(n^2)
d. θ(nlogn)

The correct answer is: θ(log^3 n)

Question **12**

Correct

Mark 1.00 out of 1.00

If a binary tree is skewed, what is the time complexity of searching an element?

a. O(n^2)
b. O(log n)
c. O(n log n)
d. O(n) ✓

The correct answer is: O(n)

Question **13**

Correct

Mark 1.00 out of 1.00

For the following recurrences T(n) = 6T(n/3) + n^2logn, give an expression for the runtime.

a. θ(√n)
b. θ(n)
c. θ(n^2logn) ✓
d. θ(n^2)

The correct answer is: θ(n^2logn)

Question **14**

Correct

Mark 1.00 out of 1.00

Which of the following statements about inserting a node in a doubly linked list (DLL) is correct?

a. Insertion at the head requires modification of both the head pointer and the previous pointer of the next node. ✓
b. Insertion at the tail does not require modification of the last node's next pointer.
c. DLL insertion is always O(1) regardless of the position.
d. Insertion at any position in a DLL requires traversal from the head.

The correct answer is: Insertion at the head requires modification of both the head pointer and the previous pointer of the next node.

Question **15**

Correct

Mark 1.00 out of 1.00

Consider the linked list implementation of a stack. Which of the following nodes is considered as Top of the stack?

a. Middle node
b. Last node
c. First node ✓
d. Any node

The correct answer is: First node

Question **16**

Incorrect

Mark 0.00 out of 1.00

Consider RAM model to execute the following algorithmic step. for i = 1 to n-1 do . How many primitive operations are there in the statement?

a. 1 + 3n.
b. 1 + n + 2(n-1).
c. 1 + 2(n-1). ⊗
d. 1 + 3(n-1).

The correct answer is: 1 + n + 2(n-1).

Question **17**

Correct

Mark 1.00 out of 1.00

Consider a queue implemented using two stacks. What is the worst-case time complexity of the dequeue operation?

a. $O(n^2)$
b. O(log n)
c. O(n) ✓
d. O(1)

The correct answer is: O(n)

Question **18**

Correct

Mark 1.00 out of 1.00

Consider the following operation performed on a stack of size 5.Push (1);Pop();Push(2);Push(3);Pop();Push(4);Pop();Pop();Push(5);After the completion of all operations, the number of elements present on stack is?

a. 2
b. 4
c. 1 ✓
d. 3

The correct answer is: 1

Question **19**

Incorrect

Mark 0.00 out of 1.00

Which of the following combinations of traversal cannot identify a binary tree uniquely?

a. In-order and pre-order
b. In-order and post-order
c. Level-order and in-order ⊗
d. Level-order and pre-order

The correct answer is: In-order and post-order

Question **20**

Correct

Mark 1.00 out of 1.00

Which of the following statement(s) about stack data structure is/are NOT correct?

a. Stack is the FIFO data structure ✓
b. New node can only be added at the top of the stack
c. Stack data structure can be implemented using linked list
d. The last node at the bottom of the stack has a NULL Link

The correct answer is: Stack is the FIFO data structure

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