

Analysis of Algorithms (Recurrences)

Question 1

What is the value of following recurrence.

$$T(n) = T(n/4) + T(n/2) + cn^2$$

$$T(1) = c$$

$$T(0) = 0$$

Where c is a positive constant

- A** $O(n^3)$
- B** $O(n^2)$
- C** $O(n^2 \text{ Log} n)$
- D** $O(n \text{ Log} n)$



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Question 2

What is the value of following recurrence. $T(n) = 5T(n/5) + \square$, $T(1) = 1$, $T(0) = 0$

- A** Theta (n)
- B** Theta (n^2)
- C** Theta (\sqrt{n})
- D** Theta ($n \log n$)

Discuss it

Question 3

What is the worst case time complexity of following implementation of subset sum problem.

```
// Returns true if there is a subset of set[] with sum equal
bool isSubsetSum(int set[], int n, int sum)
{
    // Base Cases
    if (sum == 0)
        return true;
    if (n == 0 && sum != 0)
        return false;

    // If last element is greater than sum, then ignore it
    if (set[n-1] > sum)
        return isSubsetSum(set, n-1, sum);

    /* else, check if sum can be obtained by any of the follow
       (a) including the last element
       (b) excluding the last element */
    return isSubsetSum(set, n-1, sum) ||
           isSubsetSum(set, n-1, sum-set[n-1]);
}
```

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}

- A** $O(n * 2^n)$
- B** $O(n^2)$
- C** $O(n^2 * 2^n)$
- D** $O(2^n)$

Discuss it

Question 4

Suppose $T(n) = 2T(n/2) + n$, $T(0) = T(1) = 1$ Which one of the following is false. (GATE CS 2005)

- a) $T(n) = O(n^2)$
- b) $T(n) = \Theta(n \log n)$
- c) $T(n) = \Theta(n^2)$
- d) $T(n) = O(n \log n)$

- A** A
- B** B
- C** C
- D** D

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Insertion Sort · 7 hours ago

Sumit Khatri no, quick sort requires more swaps than...

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Sumit Khatri yes, it is the only sorting technique which...

Selection Sort · 7 hours ago

Sudhakar Mishra I think it should be $2n + 1$

Discuss it

Question 5

Consider the following recurrence:

$$T(n) = 2T(\lceil \sqrt{n} \rceil) + 1, T(1) = 1$$

Which one of the following

is true?

- (A) $T(n) = \Theta(\log \log n)$
- (B) $T(n) = \Theta(\log n)$
- (C) $T(n) = \Theta(\sqrt{n})$
- (D) $T(n) = \Theta(n)$

- A** A
- B B
- C C
- D D

Discuss it

Question 6

The running time of an algorithm is represented by the following recurrence relation:

```
if n <= 3 then T(n) = n
else T(n) = T(n/3) + cn
```

Which one of the following represents the time complexity of the algorithm?

- (A) $\Theta(n)$
- (B) $\Theta(n \log n)$
- (C) $\Theta(n^2)$

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Sudhakar Mishra $(2n)!/((n+1)!*n!)$

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Sudhakar Mishra Always Y will be more than one because after...

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(D) ($n^2 \log n$)

A A

B B

C C

D D

Discuss it

Question 7

The running time of the following algorithm

```
Procedure A(n)
```

```
  If  $n \leq 2$  return(1) else return A();
```

is best described by

A $O(n)$

B $O(\log n)$

C $O(1 \log \log n)$

D $O(1)$

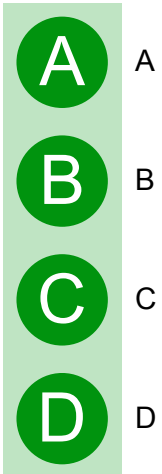
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Question 8

What is the time complexity of the following recursive function:

```
int DoSomething (int n)
{
    if (n <= 2)
        return 1;
    else
        return (DoSomething (floor(sqrt(n))) + n);
}
```

- (A) $\mathcal{O}(n)$
- (B) $\mathcal{O}(n \log n)$
- (C) $\mathcal{O}(\log n)$
- (D) $\mathcal{O}(\log \log n)$



[Discuss it](#)

Question 9

The time complexity of the following C function is (assume $n > 0$) (GATE CS 2004)

```
int recursive (mt n)
{
    if (n == 1)
        return (1);
    else
        return (recursive (n-1) + recursive (n-1));
}
```

}

A

$O(n)$

B

$O(n \log n)$

C

$O(n^2)$

D

$O(2^n)$

Discuss it

Question 10

Consider the following recurrence $T(n) = 3T(n/5) + \lg n * \lg n$ What is the value of $T(n)$?

- (A)
- (B)
- (c)
- (D)

A

A

B

B

C

C

D

D

Discuss it

Question 11

Consider the following recurrence. $T(n) = T(\text{ }) + \text{ }$ What is the value of recurrence?

- (A)
- (B)
- (B)
- (B)

- A** A
- B** B
- C** C
- D** D

Discuss it

Question 12

Which one of the following correctly determines the solution of the recurrence relation with $T(1) = 1$?

$$T(n) = 2T(n/2) + \text{Log}n$$

- A** $\Theta(n)$
- B** $\Theta(n\text{Log}n)$



$\Theta(n \cdot n)$

$\Theta(\log n)$

Discuss it

There are 12 questions to complete.

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