Started on	Monday, 18 October 2021, 3:32 PM
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Time taken	45 mins 17 secs
Grade	**24.00** out of 30.00 (**80**%)

Question **1**

Correct

Mark 1.00 out of 1.00

In a modified merge sort, the input array is splitted at a position one-third of the length(N) of the array.

Which of the following is the tightest upper bound on time complexity of this modified Merge Sort.

Recurrence Relaton:

$T(n) = T(n/3) + T(2n/3) + O(n)$

- $nlog_{2/3}n$
- $nlog_{2}n$
- $nlog_{3}n$
- $nlog_{3/2}n$ ✔

The correct answer is:

$nlog_{3/2}n$

Question **2**

Correct

Mark 1.00 out of 1.00

The average number of key comparisons done in a successful sequential search in a list of length it is

- $logn$
- $\frac{n-1}{2}$
- n
- $\frac{n+1}{2}$ ✔

The correct answer is:
$\frac{n+1}{2}$

Question **3**

Incorrect

Mark 0.00 out of 1.00

The order of an unsorted binary search algorithm is _____

- a. $O(n^2)$
- b. $O(nlogn)$
- c. $O(n)$
- d. $O(logn)$ ✖

The correct answer is:
$O(nlogn)$

Question **4**

Incorrect

Mark 0.00 out of 1.00

Solve using Masters Theorm

T(n) = 3T(n/3) - n/2

- a. $\Theta(n^2 logn)$
- b. Does not apply
- c. $\Theta(nlogn)$ ✖
- d. $\Theta(n^2)$

The correct answer is:
Does not apply

Question **5**

Correct

Mark 1.00 out of 1.00

Consider a sorting algorithm that splits the input list into two sub-lists each of which contains at least one-fifth of the elements and splitting will take at most lgn time. Then _____.

- a. T(n) = 2T(4n/5)
- b. T(n) = 2T(n/5)
- c. T(n) = 2T(n/5) + lgn
- d. T(n) = T(n/5) + T(4n/5) + lgn ✔

The correct answer is:
T(n) = T(n/5) + T(4n/5) + lgn

Question **6**

Incorrect

Mark 0.00 out of 1.00

Given two sorted lists of size m and n respectively. The number of comparisons needed in the best case by the merge sort algorithm will be _____

- a. m * n
- b. max(m, n)
- c. m + n - 1 ✖
- d. min(m, n)

The correct answer is:
min(m, n)

Question **7**

Correct

Mark 1.00 out of 1.00

Number of comparisons required for an unsuccessful search of an element in a sequential search, organized, fixed length, symbol table of length L is

- a. None of these
- b. n ✔
- c. (n+1) / 2
- d. n/2

The correct answers are:
n,
None of these

Question **8**

Correct

Mark 1.00 out of 1.00

Consider the following list:- 23, 34, 45, 69, 75, 79, 84, 89, 107, 117

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?

- Insertion Sort ✔
- QuickSort
- Merge Sort

The correct answer is:
Insertion Sort

Question **9**

Correct

Mark 1.00 out of 1.00

Solve using Masters Theorm

T(n) = 2^nT(n/2) + n^2

- a. $\Theta(n^2 logn)$
- b. $\Theta(n^2)$
- c. Does not apply ✔
- d. $\Theta(nlogn)$

The correct answer is:
Does not apply

Question **10**

Correct

Mark 1.00 out of 1.00

Assume that a merge sort algorithm in the worst case takes 30 seconds for an input of size 64. Which of the following most closely approximates the maximum input size of a problem that can be solved in 6 minutes?

- a. 256
- b. 512 ✔
- c. 2048
- d. 1024

The correct answer is:
512

Question **11**

Correct

Mark 1.00 out of 1.00

Select the most appropriate bounds for the following function.

$3n^2 + 5nln(n) + 5n + 2$

- $\Theta(ln(n))$
- $O(n^2)$ ✔
- $\Theta(nln(n))$
- $O(n)$

The correct answer is:
$O(n^2)$

Question **12**

Correct

Mark 1.00 out of 1.00

Consider this procedure

A(n)

{

if(n< 2)

return (1);

else

return (A($\sqrt{(n)}$))

}

The running time of the above algorithm is best decided by

a. $\mathcal{O}(n^2)$

b. $\mathcal{O}(Log\ Log\ n)$ ✔

c. $\mathcal{O}(Log\ n)$

d. $\mathcal{O}(n)$

The correct answer is:
$\mathcal{O}(Log\ Log\ n)$

Question **13**

Correct

Mark 1.00 out of 1.00

Which of the following is correct recurrence for worst case of Binary Search?

- $T(n) = T(n/2) + O(1)$ and $T(1) = T(0) = 1$ ✔
- $T(n) = T(n-2) + O(1)$ and $T(1) = T(0) = 1$
- $T(n) = 2T(n/2) + O(1)$ and $T(1) = T(0) = 1$
- $T(n) = T(n-1) + O(1)$ and $T(1) = T(0) = 1$

The correct answer is:

$T(n) = T(n/2) + O(1)$ and $T(1) = T(0) = 1$

Question **14**

Correct

Mark 1.00 out of 1.00

Consider a sorted array with n distinct elements. Which of the following operation is not O(1).

- a. Delete largest element
- b. Insert an element ✔
- c. Find the third largest element
- d. Find the i^{th} smallest element

The correct answer is:
Insert an element

Question **15**

Correct

Mark 1.00 out of 1.00

Solution of following recurrence using using Masters Theorem is?

T(n) = 3T(n/2) + n^2

- a. $\Theta(n^2)$ ✔
- b. Does not apply
- c. $\Theta(n^2 logn)$
- d. $\Theta(nlogn)$

The correct answer is:
$\Theta(n^2)$

Question **16**

Correct

Mark 1.00 out of 1.00

What is the time complexity of Quick sort in Worst case?

- $O(\sqrt{(n)})$
- $O(nlogn)$
- $O(n^2)$ ✔
- $O(nlogn)$

The correct answer is:

$O(n^2)$

Question **17**

Incorrect

Mark 0.00 out of 1.00

Which one is false?

(a) $n^{1.999} = o(n^2)$

(b) $n = o(n)$

(c) $n^2 = \omega(n^2)$

(d) $n^{2logn} = \omega(n^2)$

- Only (c) ✖
- Only (a)
- Both (b) and (c)
- Both (a) and (c)

The correct answer is:
Both (b) and (c)

Question **18**

Correct

Mark 1.00 out of 1.00

Which one of the following is the recurrence equation for the worst case time complexity of the Quicksort algorithm for sorting n (≥2) numbers? In the recurrence equations given in the options below, c is a constant.

- a. $T(n) = T(n-1) + T(1) + cn$ ✔
- b. $T(n) = 2T(n-1) + cn$
- c. $T(n) = 2T(n/2) + cn$
- d. $T(n) = T(n/2) + cn$

The correct answer is:
$T(n) = T(n-1) + T(1) + cn$

Question **19**

Correct

Mark 1.00 out of 1.00

Look this algorithm and choose the complexity:

```
Algo Funct1 (n)
{
p =0;
for (i =1; p <= n; i++)
  {
     p =p+i;
   }
}
```

- $O(n)$
- $O(n^2)$
- $O(\sqrt{n})$ ✔
- $O(logn)$

The correct answer is:
$O(\sqrt{n})$

Question **20**

Correct

Mark 1.00 out of 1.00

Solution for the recurrence T(n) = 4T(n/2) + n^2 is _____.

- a. $O(n^2 lgn)$ ✔
- b. $O(n^2)$
- c. $O(n)$
- d. $O(nlgn)$

The correct answer is:
$O(n^2 lgn)$

Question **21**

Correct

Mark 1.00 out of 1.00

Consider the following three claims:

1. $(n + k)^m = \Theta(n^m)$, where k and m are constants

2. $2^{n+1} = O(2^n)$

3. $2^{2n+1} = O(2^n)$

Which of these claims are correct?

- a. 2 and 3
- b. 1 and 3
- c. 1 and 2 ✔
- d. 1, 2 and 3

The correct answer is:
1 and 2

Question **22**

Incorrect

Mark 0.00 out of 1.00

The time complexity of the following C function is (assume n > 0

```
 Algo func1 ( n)
{
    if ( n ==1)
          return 1;

else
     return ( func1(n-1)+func1(n-1) );


}
```

- $O(nlogn)$
- $O(n^2)$
- $O(2^n)$
- $O(n)$ ✖

The correct answer is:
$O(2^n)$

Question **23**

Correct

Mark 1.00 out of 1.00

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

$T(n) = 2T(n/2) + logn$

- $\Theta(n^2)$
- $\Theta(n)$ ✔
- $\Theta(nlogn)$
- $\Theta(logn)$

The correct answer is:
$\Theta(n)$

Question **24**

Correct

Mark 1.00 out of 1.00

What is time complexity of following function?

```
int fun(int n)
{  int count=0;
   for (int i= n; i> 0; i/=2)
      for(int j=0; j< i; j++)
          count+= 1;
   return count;
}
```

- a. O(n^2)
- b. O(nloglogn)
- c. O(n) ✔
- d. O(nlogn)

The correct answer is:
O(n)

Question **25**

Correct

Mark 1.00 out of 1.00

Select the most appropriate bounds for the following function.

$6n + 7ln(n) + 8nln(n) + 9$

- $\Theta(nln(n))$ ✔
- $O(n^2)$
- $O(n)$
- $\Theta(ln(n))$

The correct answer is:
$\Theta(nln(n))$

Question **26**

Correct

Mark 1.00 out of 1.00

The concept of order (Big O) is important because _____

- a. It can be used to decide the best algorithm that solves a given problem ✔
- b. It gives simplistic function capturing how the space or the time function grows with time.
- c. It is the lower bound of the growth rate of the algorithm
- d. Both (a) and (b)

The correct answers are:
It can be used to decide the best algorithm that solves a given problem, It gives simplistic function capturing how the space or the time function grows with time. ,

Both (a) and (b)

Question **27**

Correct

Mark 1.00 out of 1.00

What is the complexity of this problem?

```
power(x, y)
{
   int temp;
  if(  y ==0)
       return 1;
  temp = power(x,  y/2);
  if(y % 2 ==0)
      return (temp*temp);
  else
      return (x * temp* temp);

}
```

- $O(logn)$ ✔
- $O(nlogn)$
- $O(n)$
- $O(loglogn)$

The correct answer is:
$O(logn)$

Question **28**

Correct

Mark 1.00 out of 1.00

Consider n ≥ m.

```
int gcd(n, m)
{
if(n%m=0) return m;
n= n%m;
return gcd(m, n);
}
```

How many recursive calls are made by this function?

- a. $O(logn)$ ✔
- b. $O(n)$
- c. $O(n^2)$
- d. $O(loglogn)$

The correct answer is:
$O(logn)$

Question **29**

Incorrect

Mark 0.00 out of 1.00

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

- a. $\Theta(n^{log_3^5})$ ✖
- b. $\Theta(logn)$
- c. $\Theta(nlog\ n)$
- d. $\Theta(n^{log_5^3})$

The correct answer is:
$\Theta(n^{log_5^3})$

Question **30**

Correct

Mark 1.00 out of 1.00

Consider the complexity function of an algorithm as $100n + 5$. Select which is appropriate pair values of c and n_0 possible such the function can have bound as $O(n)$ solving by $100n + 5 \leq 100n + n$.

- $c = 101, n_0 = 1$
- $c = 101, n_0 = 5$ ✔
- $c = 100, n_0 = 1$
- $c = 101, n_0 = 2$
- $c = 100, n_0 = 5$

The correct answer is:
$c = 101, n_0 = 5$

◄ Quiz:- 08/10/2021

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