MIDTERM EXAMINATION
Spring 2010
CS502- Fundamentals of Algorithms (Session - 6)

Time: 60 min
Marks: 38

Question No: 1 (Marks: 1) - Please choose one

Random access machine or RAM is a/an

- ▶ Machine build by Al-Khwarizmi
- ▶ Mechanical machine
- ▶ Electronics machine
- ▶ **Mathematical model**

Question No: 2 (Marks: 1) - Please choose one

_____ is a graphical representation of an algorithm

- ▶ Σ notation
- ▶ Θ notation
- ▶ **Flowchart**
- ▶ Asymptotic notation

Question No: 3 (Marks: 1) - Please choose one

A RAM is an idealized machine with _____ random-access memory.

- ▶ 256MB
- ▶ 512MB
- ▶ **an infinitely large**
- ▶ 100GB

Question No: 4 (Marks: 1) - Please choose one

What type of instructions Random Access Machine (RAM) can execute? Choose best answer

- ▶ Algebraic and logic
- ▶ Geometric and arithmetic
- ▶ **Arithmetic and logic**
- ▶ Parallel and recursive

Question No: 5 (Marks: 1) - Please choose one

What will be the total number of max comparisons if we run brute-force maxima algorithm with n elements?

- ▶ n^2
- ▶ $n^{\frac{n}{2}}$
- ▶ n

- n^8

Question No: 6 (Marks: 1) - Please choose one

What is the solution to the recurrence $T(n) = T(n/2)+n$.

- $O(\log n)$
- **$O(n)$**
- **$O(n \log n)$**
- $O(n^2)$

Question No: 7 (Marks: 1) - Please choose one

Consider the following code:

```
For(j=1; j<n;j++)
        For(k=1; k<15;k++)
                For(l=5; l<n; l++)
                {
                        Do_something_constant();
                }
```

What is the order of execution for this code.

- **$O(n)$**
- $O(n^3)$
- $O(n^2 \log n)$
- $O(n^2)$

Question No: 8 (Marks: 1) - Please choose one

Consider the following Algorithm:

```
Factorial (n){
  if (n=1)
    return 1
  else
     return (n * Factorial(n-1))
{
```

Recurrence for the following algorithm is:

- T(n) = T(n-1) +1
- T(n) = nT(n-1) +1
- T(n)= T(n-1) +n
- **T(n)=T(n(n-1)) +1**

Question No: 9 (Marks: 1) - Please choose one

What is the total time to heapify?

- **O(log n)**
- O(n log n)
- $O(n^2 \log n)$
- $O(\log^2 n)$

Question No: 10 (Marks: 1) - Please choose one

When we call heapify then at each level the comparison performed takes time

- **It will take Θ (1)**
- Time will vary according to the nature of input data
- It can not be predicted
- It will take Θ (log n)

Question No: 11 (Marks: 1) - Please choose one

In Quick sort, we don't have the control over the sizes of recursive calls

- **True**
- False
- Less information to decide
- Either true or false

Question No: 12 (Marks: 1) - Please choose one

Is it possible to sort without making comparisons?

- **Yes**
- No

Question No: 13 (Marks: 1) - Please choose one

If there are Θ (n^2) entries in edit distance matrix then the total running time is

- Θ (1)
- **Θ (n^2)**
- Θ (n)
- Θ (n log n)

Question No: 14 (Marks: 1) - Please choose one

For Chain Matrix Multiplication we can not use divide and conquer approach because,

- We do not know the optimum k
- **We use divide and conquer for sorting only**
- We can easily perform it in linear time
- Size of data is not given

Question No: 15 (Marks: 1) - Please choose one

The Knapsack problem belongs to the domain of _____ problems.

- **Optimization**
- NP Complete
- Linear Solution
- Sorting

Question No: 16 (Marks: 1) - Please choose one

Suppose we have three items as shown in the following table, and suppose the capacity of the knapsack is 50 i.e. W = 50.

Item	Value	Weight
1	60	10
2	100	20

3	120	30

The optimal solution is to pick

- ► Items 1 and 2
- ► Items 1 and 3
- ► **Items 2 and 3**
- ► None of these

Question No: 17 (Marks: 2)

Describe an efficient algorithm to find the ***median*** of a set of 10^6 integers; it is known that there are fewer than 100 distinct integers in the set

Question No: 18 (Marks: 2)

How we can avoid unnecessary repetitions for recursive calls?

We can avoid this unnecessary repetitions by writing down the results of recursive calls and looking them up again if we need them later. This process is called *memoization*

Question No: 19 (Marks: 2)

Draw the cost table for chain matrix multiplication problem with initial state.

$(A_1)(A_2A_3A_4 \ldots A_n)$
or $(A_1A_2)(A_3A_4 \ldots A_n)$
or $(A_1A_2A_3)(A_4 \ldots A_n)$
. . . . . .
or $(A_1A_2A_3A_4 \ldots A_{n-1})(A_n)$

Question No: 20 (Marks: 3)

Solve it,

$$T(n) = \frac{1}{2}\sum_{q=1}^{2}(T(q-1) + T(2-q) + 2)$$

Question No: 21 (Marks: 3)

What are Catalan numbers? Give the formula.

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Question No: 22 (Marks: 5)

What is the effect of calling Max-Heapify(A, i) when i > heap-size[A]/2?

Question No: 23 (Marks: 5)

Write the pseudo code for 0/1 knapsack algorithm developed using dynamic programming technique.

AA
Dear fellows
My todays papre of algo(CS502)

write these word 3 different format
"MATHS and ARTS" 3marks

explain the average and worst case of quick sort. 2marks

how many combination of ..... (sorry i forgot) 2marks

define the cost table of initial stae of 3marks

suggest and describe one modification of implmenting quick sort 5marks

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