VIRTUAL UNIVERSITY OF PAKISTAN

MID TERM PAST PAPER

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Question No : 1 of 26 Marks: 1 (Budgeted Time 1 Min)

Unlike programs, algorithms to be understood primarily by _____ and_____

Answer (Please select your correct option)

- Machines, not people
- Mathematical expressions, not algebraic expressions
- Programmers, not machines
- RAM, not programmer

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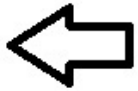
Question No : 2 of 26 Marks: 1 (Budgeted Time 1 Min)

Recurrences are useful for analyzing

Answer (Please select your correct option)

- Recursive Algorithms
- Simple Algorithms
- Parallel Algorithms
- Parallel Algorithms & Recursive Algorithms



Question No : 3 of 26 Marks: 1 (Budgeted Time 1 Min)

Divide-and-conquer involves breaking the problem into a small number of

Answer (Please select your correct option)

- pivot
- Sub problems
- Selection
- Sieve

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Question No : 4 of 26 Marks: 1 (Budgeted Time 1 Min)

In which order we can sort?

Answer (Please select your correct option)

- increasing order or decreasing order 
- both at the same time
- increasing order only
- decreasing order only

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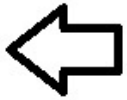
Question No : 5 of 26 Marks: 1 (Budgeted Time 1 Min)

Comparison based sorting algorithms can not run faster than

Answer (Please select your correct option)

- Ω (n log n)
- O (n log n)
- Ω (n^2)
- O (n^2)



Question No : 6 of 26 Marks: 1 (Budgeted Time 1 Min)

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

Answer (Please select your correct option)

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

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Question No : 7 of 26 Marks: 1 (Budgeted Time 1 Min)

Who invented Quick sort procedure?

Answer (Please select your correct option)

- Hoare 
- Sedgewick
- Mellroy
- Coreman

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Question No : 8 of 26 Marks: 1 (Budgeted Time 1 Min)

Counting sort assumes that the numbers to be sorted are in the range 1 to k, where k is

Answer (Please select your correct option)

- Small
- Large
- No restriction on k
- None of these

Question No : 9 of 26 Marks: 1 (Budgeted Time 1 Min)

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

Answer (Please select your correct option)

- $\Theta(1)$
- $\Theta(n^2)$ ⇦ correct answer solve by hadi
- $\Theta(n)$
- $\Theta(n \log n)$

Question No : 10 of 26 Marks: 1 (Budgeted Time 1 Min)

When a recursive algorithm revisits the same problem over and over again, we say that the optimization problem has _____ sub-problems.

Answer (Please select your correct option)

- Overlapping
- Over costing
- Optimized
- None of these

Question No : 11 of 26 Marks: 1 (Budgeted Time 1 Min)

A p × q matrix A can be multiplied with a q × r matrix B. The result will be a p × r matrix C. In particular, for $1 \leq i \leq p$ and $1 \leq j \leq r$,

Answer (Please select your correct option)

- $C[i, j] = \sum_{k=1}^{q} A[i,k]B[k,j]$
- $C[i, j] = \sum_{k=1}^{q} A[k,i]B[k,j]$
- $C[i, j] = \sum_{k=1}^{q} A[k,i]B[j,k]$
- None of these

Question No : 12 of 26 Marks: 1 (Budgeted Time 1 Min)

We can find the product A x B of matrices A and B, only if they are compatible which means,

Answer (Please select your correct option)

- No of Columns of A must be equal to No of Rows of B
- No of Columns of A must be equal to No of Columns of B
- No of Rows of A must be equal to No of Rows of B
- Order of A must be equal to order of B

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Question No : 13 of 26 Marks: 1 (Budgeted Time 1 Min)

Time complexity of chain matrix multiplication is $\Theta(n^3)$ and space complexity is

Answer (Please select your correct option)

- $\Theta(n^2)$ 
- $\Theta(n^3)$
- $\Theta(n \log n)$
- $\Theta(\log n)$

Question No : 14 of 26 Marks: 1 (Budgeted Time 1 Min)

Computational model of sequential RAM is:

Answer (Please select your correct option)

- Parallel machines may be expensive to model and have more computational power than sequential RAM.
- Computational power of sequential RAM is same as that of parallel machines only time efficiency is achieved with parallel machines
- Both first and second options are true for the statement
- Less powerful computational wise than parallel machines

Question No : 15 of 26 Marks: 1 (Budgeted Time 1 Min)

The worst case running time of the algorithm given below is,

```
MAXIMA(int n, Point P[1...n])
1  for i ← 1 to n        n times
2  do maximal ← true
```

Answer (Please select your correct option)

- $\Theta(n^6)$
- $\Theta\left(n^{\frac{2n}{6}}\right)$
- $\Theta(n^2)$
- $\Theta(2n \lg 6)$

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Question No : 15 of 26 Marks: 1 (Budgeted Time 1 Min)

```
1  for i ← 1 to n          n times
2  do maximal ← true
3     for j ← 1 to n       n times
4     do
5        if (i ≠ j)&(P[i].x < P[j].x)&(P[i].u < P[j].u)   4 accesses
```

Answer (Please select your correct option)

- $\Theta(n^6)$
- $\Theta\left(n^{\frac{2n}{6}}\right)$
- $\Theta(n^2)$
- $\Theta(2n \lg 6)$

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Question No : 15 of 26 Marks: 1 (Budgeted Time 1 Min)

```
3     for j ← 1 to n        n times
4     do
5        if (i ≠ j)&(P[i].x ≤ P[j].x)&(P[i].y ≤ P[j].y)    4 accesses
6           then maximal ← false break
7     if maximal
```

Answer (Please select your correct option)

- $\Theta(n^6)$
- $\Theta\left(n^{\frac{2n}{6}}\right)$
- $\Theta(n^2)$ ⇦ correct answer solve by hadi
- $\Theta(2n \lg 6)$

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Question No : 15 of 26 Marks: 1 (Budgeted Time 1 Min)

```
5        if (i ≠ j)&(P[i].x ≤ P[j].x)&(P[i].y ≤ P[j].y)  4 accesses
6          then maximal ← false break
7      if maximal
8        then  output P[i].x, P[i].y   2 accesses
```

Answer (Please select your correct option)

- $\Theta(n^6)$
- $\Theta\left(n^{\frac{2n}{6}}\right)$
- $\Theta(n^2)$
- $\Theta(2n \lg 6)$

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Question No : 16 of 26 Marks: 1 (Budgeted Time 1 Min)

In Sieve Technique, we know _____

Answer (Please select your correct option)

- Item of ineterst
- Order of items
- complexity of items
- All items are of ineterst

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[redacted]

Question No : 17 of 26 Marks: 1 (Budgeted Time 1 Min)

In Random access machine, instructions are executed _____.

Answer (Please select your correct option)

- five at a time
- infinite instructions at a time
- one-by-one
- parallel

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Question No : 18 of 26 Marks: 1 (Budgeted Time 1 Min)

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

Answer (Please select your correct option)

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

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Question No : 19 of 26 Marks: 1 (Budgeted Time 1 Min)

Which of the following is calculated with **Big O notation**?

Answer (Please select your correct option)

- Medium bounds
- Lower bounds
- Upper bounds
- Both upper and lower bound

correct answer solve
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Question No : 20 of 26 Marks: 1 (Budgeted Time 1 Min)

Which of the following functions grows fastest as n gets larger?

Answer (Please select your correct option)

- $n^{10}2^n$
- $n^8 3^n$
- $n^5 5^n$
- $n^3 2^{2n}$

Question No : 21 of 26 Marks: 2 (Budgeted Time 4 Min)

What is the essential constraint for the Counting Sort?

Answer (Please click here to Add Answer)

Question No : 22 of 26 Marks: 2 (Budgeted Time 4 Min)

How we proceed with m entries in cost table for chain matrix multiplication problem?

Answer (Please click here to Add Answer)

Question No : 23 of 26 Marks: 3 (Budgeted Time 6 Min)

Solve it,

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

Answer (Please click here to Add Answer)

Question No : 24 of 26 Marks: 3 (Budgeted Time 6 Min)

True or False: A sequence of values in a row of the dynamic programming table for an instance of the knapsack problem is always non-decreasing. Give a brief description.

Answer (Please click here to Add Answer)

Question No : 25 of 26 Marks: 5 (Budgeted Time 10 Min)

Whether each of the following sorting algorithms is stable and in-place or not?

Sorting Algorithm	Stable	In-Place
Merge Sort	Yes/No	Yes/No
Heapsort	Yes/No	Yes/No
Quicksort	Yes/No	Yes/No
Counting Sort	Yes/No	Yes/No

Answer (Please click here to Add Answer)

Question No : 25 of 26 Marks: 5 (Budgeted Time 10 Min)

Merge Sort	Yes/No	Yes/No
Heapsort	Yes/No	Yes/No
Quicksort	Yes/No	Yes/No
Counting Sort	Yes/No	Yes/No
Bubble Sort	Yes/No	Yes/No

Answer (Please click here to Add Answer)

Question No : 26 of 26 Marks: 5 (Budgeted Time 10 Min)

Write down the steps of dynamic programming strategy.

Answer (Please click here to Add Answer)

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