

VIRTUAL UNIVERSITY OF PAKISTAN

A Good Education is a Foundation For a Better Future

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TEAM HADI(VU LAHORE)

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Best of luck!



Question No : 1 of 26

Marks: 1 (Budgeted Time 1 Min)

Al-Khwarizmi's work was written in a book titled _____

Answer (Please select your correct option)

☐ al Kitab al-mukhtasar fi hisab al-jabr wa'l-muqabalah



☐ Calculation by Completion

☐ al Kitab

☐ al-jabr wa'l-muqabalah

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Question No : 2 of 26

Marks: 1 (Budgeted Time 1 Min)

What is the asymptotic growth of $\frac{4n^3 + 15n^2 + 11n}{6}$?

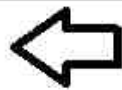
Answer (Please select your correct option)

☐ $\Theta\left(\frac{4n^3 + 15n^2 + 11n}{6}\right)$

☐ $\Theta(4n^3 + 15n^2 + 11n)$

☒ $\Theta(15n^2)$

☐ $\Theta(n^3)$



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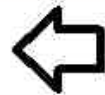
Question No : 3 of 26

Marks: 1 (Budgeted Time 1 Min)

The reason for introducing Sieve Technique algorithm is that it illustrates a very important special case of,

Answer (Please select your correct option)

☒ divide-and-conquer



☐ decrease and conquer

☐ greedy nature

☐ 2-dimension Maxima

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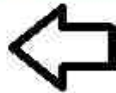
Question No : 4 of 26

Marks: 1 (Budgeted Time 1 Min)

Strictly increasing arrays are _____ input for quick sort

Answer (Please select your correct option)

☐ The worst-case



☐ The best-case

☐ Average case

☐ None of the given

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Question No : 5 of 26

Marks: 1 (Budgeted Time 1 Min)

The running time of quick sort depends heavily on the selection of

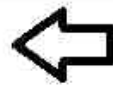
Answer (Please select your correct option)

☐ Required Output

☐ Input and output

☒ Pivot

☐ Input data only



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Question No : 6 of 26

Marks: 1 (Budgeted Time 1 Min)

Quick sort is based on divide and conquer paradigm. In the Combine step of divide and conquer process

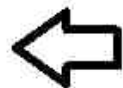
Answer (Please select your correct option)

☐ No work is needed to combine the sub-arrays, the array is already sorted

☐ Work is needed to combine the sub-arrays, the array is not already sorted.

☐ Merging the Arrays

☐ Dividing the arrays



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Question No : 7 of 26

Marks: 1 (Budgeted Time 1 Min)

In in-place sorting algorithm is one that uses no _____ arrays for storage.

Answer (Please select your correct option)

☐ two dimensional

☐ three dimensional

☐ n dimensional

☐ additional



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Question No : 8 of 26

Marks: 1 (Budgeted Time 1 Min)

Bubble sort and insertion sort can be implemented as stable algorithms but _____ can not be.

Answer (Please select your correct option)

☐ selection sort



☐ bubble sort

☐ merge sort

☐ stable sort

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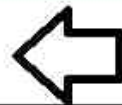
Question No : 9 of 26

Marks: 1 (Budgeted Time 1 Min)

Catalan number is given by the formula

Answer (Please select your correct option)

☐ $C(n) = \frac{1}{n+1} \binom{2n}{n}$



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☐ $C(n) = \frac{1}{n-1} \binom{2n}{n}$

☐ $C(n) = \frac{1}{n+1} \binom{n}{2n}$

☐ $C(n) = \frac{1}{n-1} \binom{n}{2n}$

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Question No : 10 of 26

Marks: 1 (Budgeted Time 1 Min)

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

Answer (Please select your correct option)

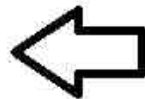
☐ No of Columns of A must be equal to No of Rows of B

☐ 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 : 11 of 26

Marks: 1 (Budgeted Time 1 Min)

Matrix – Chain – Order is _____ than the exponential time method of enumerating all possible parenthesizations and checking each one.

Answer (Please select your correct option)

☐ Much more efficient

☐ Only fractional efficient

☐ Worst

☐ Too slow

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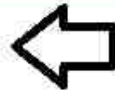
Question No : 12 of 26

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)

☐ $\Theta(n^2)$



☐ $\Theta(n^3)$

☐ $\Theta(n \log n)$

☐ $\Theta(\log n)$

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Question No : 13 of 26

Marks: 1 (Budgeted Time 1 Min)

The Knapsack problem belongs to the domain of _____ problems.

Answer (Please select your correct option)

☐ Optimization



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☐ NP Complete

☐ Linear Solution

☐ Sorting

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Question No : 14 of 26

Marks: 1 (Budgeted Time 1 Min)

The recurrence relation of Tower of Hanoi is given below

$$T(n) = \begin{cases} 1 & \text{if } n=1 \\ 2T(n-1) + 1 & \text{if } n > 1 \end{cases}$$

In order to move a tower of 4 rings from one peg to another, how many ring moves are required?

Answer (Please select your correct option)

☐ 15

☐ 7

☐ 12

☐ 32

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Question No : 15 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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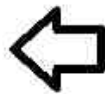
Question No : 16 of 26

Marks: 1 (Budgeted Time 1 Min)

Algorithm's essential elements are

Answer (Please select your correct option)

- ☐ Step wise solution
- ☐ Stepwise solution and finite time
- ☒ Step wise solution finite inputs
- ☐ Stepwise approach in which time and memory does not matter.



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Which one is the correct conversion of the given algorithm to sigma notation?

MAXIMA(int n, Point P[1... n])

1 for i ← 1 to n

2 do maximal ← true

3 if P[i].x > maximal.x then maximal ← P[i]

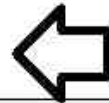
Answer (Please select your correct option)

☐ $\sum_{i=1}^n 4n + 4$

☐ $\sum_{i=1}^n 4n + 2$

☐ $\sum_{i=1}^n 4n + 2n$

☐ $\sum_{i=1}^n 2n + 2$



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Question No : 18 of 26

Marks: 1 (Budgeted Time 1 Min)

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

Answer (Please select your correct option)

☐ Lower bounds

☒ Upper bounds



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☐ Both upper and lower bound

☐ Medium bounds

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Question No : 19 of 26

Marks: 1 (Budgeted Time 1 Min)

Suppose we have an algorithm that carries out N^2 operations for an input of size N . Let us say that a computer takes 1 microsecond ($1/1000000$ second) to carry out one operation. How long does the algorithm run for an input of size 3000?

Answer (Please select your correct option)

☐ 90 seconds

☒ 9 seconds

☐ 0.9 seconds

☐ 0.09 seconds

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Question No : 20 of 26

Marks: 1 (Budgeted Time 1 Min)

Which one is the best algorithm from the following with respect to running time?

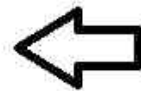
Answer (Please select your correct option)

☐ $\Theta(n)$

☒ $\Theta(n^2)$

☐ $\Theta(n \log n)$

☐ $\Theta(n^3)$



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Question No : 21 of 26

Marks: 2 (Budgeted Time 4 Min)

Consider sorting three numbers a_1 , a_2 , and a_3 with comparison-based sorting algorithms then how many combinations are possible?

Answer (Please [click here to Add Answer](#))



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Answer (Please [click here](#) to Add Answer)



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What will be the sorting techniques by analyzing the followings?

- (i) Whenever two consecutive items are found in an array that is out of order, swap them.
- (ii) Assume that $A[1 \dots i - 1]$ have already been sorted. Add $A[i]$ into its proper position in this sub array. Create this position by shifting all larger elements to the right.
- (iii) Assume that $A[1 \dots i - 1]$ contain the $i - 1$ smallest elements in sorted order. Find the smallest element in $A[i \dots n]$. Swap it with $A[i]$.

Answer ([Please click here to Add Answer](#))



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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)



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Question No : 25 of 26

Marks: 5 (Budgeted Time 10 Min)

Draw the final **Max-Heap** structure for the following array.

50, 31, 45, 30, 2, 7, 40, 12, 28, 1

You can show the final result (tree) only.

Answer ([Please click here to Add Answer](#))



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Question No : 26 of 26

Marks: 5 (Budgeted Time 10 Min)

Describe three solution paths for edit distance of these two given words,

1. MATHS
2. ARTS

Answer ([Please click here to Add Answer](#))



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