# CS502 - Fundamentals of Algorithms

**File Version Update: (Dated: 28-Nov-2011)**

- MCQs GIGA File (Done)
- **My Composed MCQs from Lecture 1_to12 Included**
- **Someone Collection of MCQz from Lecture 1 to 22 Also included in this file.**

# THIS FILE IS SHARED IN BETA MEAN THAT ONLY MCQS COLLECTION IS SHARED WITH YOU ALL.

**Final Version of File is in Progress and will be shared as soon as it get completed.**

# KEEP SHARING

**Disclaimer: There might be some human errors, if you find please let me know at** pak.nchd@gmail.com , duplication of data may be possible but at least possible level.

# Current paper of Cs502 Fall 2011

**28 november 2011**

***Shared by Anum Arshed (Thanks to her)***

Mcqs past paper men say koi aik 2 hi tha bs

20 MCQs most about running time and worst case time of algorithms.

1. Worst case for edit distance algorithm? What is the simple change that can change the worst case time ? 5 marks
2. Write Pseudo code for KNAPSACK algorithm? 5 marks
3. Spelling correction in edit distance? 3 marks
4. Differentiate b/w Bubble sort, insertion sort and selection sort? 3 marks
5. Average case and worst case time for quick sort? 2 marks

Another Paper,

1. Suggest and describe modifications of the implementation of quick sort that will improve its performance. (05 marks)
2. Complete given cost table. (05 marks)
3. Why do we analyze the average case performance of a randomized algorithm and not its worse case performance. (03 marks)
4. Why value in row of a dynamic programming table of knapsack is always non-decreasing? (03 marks)
5. How we build heap? (02 marks)
6. Find cost of (A1(A2A3)). (02 marks)

**THANKS TO THESE WHO SHARED AND SHARING NOW**

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**MCQz**

**MCQz (Set-1) From Lecture 1 to 12**

This is my Own Compilation from Handouts.........(Author: Muhammad Ishfaq)

**Questions**

**Question No: 1** The word Algorithm comes from the name of the muslim author _______________

A. Ibne-ul Hasem

B. **Abu Ja'far Mohammad ibn Musa al-Khowarizmi**

C. Jaber Bin Hayan

D. None

**Correct Option : B**

**Question No: 2** Abu Ja'far Mohammad ibn Musa al-Khowarizmi was born in the eighth century at Khwarizm (Kheva), in______________

A. Iraq

B. **Uzbekistan**

C. Turkey

**Correct Option : B**

**Question No: 3** Al-Khwarizmi died _________ C.E.___

A. around 900

B. around 700

C. **around 840**

**Correct Option : C**

**Question No: 4** Al-Khwarizmi's work was written in a book titled al Kitab al-mukhatasar fi hisab al-jabr wa'l-muqabalah (The Compendious Book on Calculation by Completion and Balancing)___

A. **True**

□. False

**Correct Option : A**

**Question No: 5** An _________ is thus a sequence of computational steps that transform the input into output.___

A. Data Structure

B. Data Process

C. **Algorithm**

D. none

**Correct Option :** **C**
**Question No:** **6** Like a program, an algorithm is a mathematical entity, which is not independent of a specific programming language, machine, or compiler.___

A. True

B. **False**

**Correct Option :** **B**
**Question No:** **7** ________ of the courses in the computer science program deal with efficient algorithms and data structures,___

A. None

B. **Many**

C. Some

**Correct Option :** **B**
**Question No:** **8** Compilers, operating systems, databases, artificial intelligence, computer graphics and vision, etc. use algorithm.____________

A. False

B. **True**

**Correct Option :** **B**
**Question No:** **9** This course will consist of following major section(s). Select Correct Option

1.The first is on the mathematical tools necessary for the analysis of algorithms. This will focus on asymptotics, summations, recurrences.

2- The second element will deal with one particularly important algorithmic problem: sorting a list of numbers.

3-The third of the course will deal with a collection of various algorithmic problems and solution techniques.

4- Finally we will close this last third with a very brief introduction to the theory of NP-completeness.

A. 1-2

B. 1-2-3

C. 1-3-4

D. **All**

**Correct Option :** **D**
**Question No:** **10** NP-complete problem are those for which ______ algorithms are known, but no one knows for sure whether efficient solutions might exist___

A. efficient

B. **no efficient**

C. none

**Correct Option :** **B**
**Question No:** **11** Analyzig algorithms in terms of the amount of computational resources that the algorithm requires. These resources include mostly ______________

A. running time

B. memory

C. **running time and memory**

D. none

**Correct Option :** **C**
**Question No:** **12** Ideally this model should be a reasonable abstraction of a standard generic single-processor machine. We call this model a _____.

A. RAM Memory

B. ROM Memory

C. **random access machine or RAM**

**Correct Option :** **C**
**Question No:** **13** A RAM is an idealized machine with___

A. an infinitely large random-access memory.

B. with Instructions are executed one-by-one (there is no parallelism)

C. single processor machine

D. **all**

**Correct Option :** **D**
**Question No:** **14** We assume that in RAM machine , each basic operation takes the ________ constant time to execut.

A. **same**

B. different

**Correct Option :** **A**

**Question No:** **15** A point p in 2-dimensional space be given by its integer coordinates, p = (p.x, p.y).___

A. **true**

B. false

**Correct Option :** **A**

**Question No:** **16** A point p is not said to be dominated by point q if q.x ≤ p.x and q.y ≤ p.y.___

A. **true**

B. false

**Correct Option :** **A**

**Question No:** **17** Given a set of n points, P = {p1, p2, . . . , pn} in 2-space a point is said to be _________ if it is not dominated by any other point in P.

A. **maximal**

B. mininal

C. average

**Correct Option :** **A**

**Question No:** **18** Brute-force algorithm is defined as ,It is a very general problem-solving technique that consists of systematically enumerating all possible candidates for the solution and checking whether each candidate satisfies the problem's statement.s

___

A. false

B. **true**

**Correct Option :** **B**

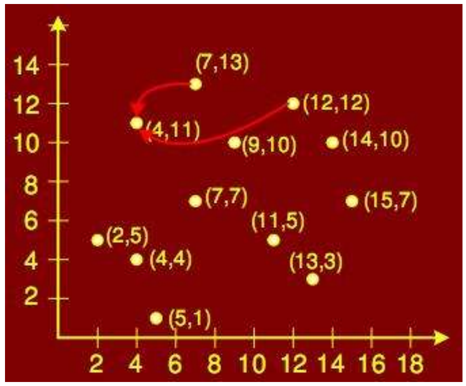
**Question No:** **19** There are no formal rules to the syntax of the pseudo code.___

A. **true**

B. false

**Correct Option :** **A**

**Question No:** **20** From the figure select the correct statement.___




A. Point (4,11) dominate (7, 7)

B. Point (7,13) dominate (9.10)

C. **Point (7,13) dominate (7, 7)**

D. Point (13,3) dominate (9,10)

**Correct Option :** **C**

**Question No:** **21** Worst-case time is the maximum running time over all (legal) inputs of size n is given in figure where I denote an input instance, let |I| denote its length, and let T(I) denote the running time of the algorithm on input I.___

$$T_{worst}(n) = \max_{|I|=n} T(I)$$

A. false

B. **true**

**Correct Option :** **B**

**Question No:** **22** ______________ is the average running time over all inputs of size n. Let p(I) denote the probability of seeing this input. The average-case time is the weighted sum of running times with weights.___

$$T_{worst}(n) = \max_{|I|=n} T(I)$$

A. Worst-case time

B. **Average-case time**

C. none

**Correct Option :** **B**

**Question No:** **23** When n is large, n^2 term will be much larger than the n term and will dominate the running time.___

A. **true**

B. false

**Correct Option :** **A**

**Question No:** **24** We will say that the worst-case running time is Θ(n^2). This is called ________________

A. the asymptotic growth rate of the function.

B. itteration growth rate of the function.

C. recursive growth rate of the function.

D. none

**Correct Option :** **A**

**Question No:** **25** Given a finite sequence of values a1, a2, . . . , an, their sum a1 + a2 + . . . + an is expressed in summation notation as (click figure to see)___

$$\sum_{i=1}^{n} a_i$$

A. **true**

B. false

**Correct Option :** **A**

**Question No:** **26** If c is a constant then (see figure..)___

$$\sum_{i=1}^{n} ca_i = c\sum_{i=1}^{n} a_i$$

$$\sum_{i=1}^{n} (a_i + b_i) = \sum_{i=1}^{n} a_i + \sum_{i=1}^{n} b_i$$

A **true**

B. false

**Correct Option :** **A**

**Question No:** **27** Formule in figure is___

$$\sum_{i=1}^{n} (a_i + b_i) = \sum_{i=1}^{n} a_i + \sum_{i=1}^{n} b_i$$

A. **correct**

B. wrong

**Correct Option :** **A**

**Question No:** **28** Figure shows ___

$$\sum_{i=1}^{n} i = 1 + 2 + \ldots + n$$

$$= \frac{n(n+1)}{2} = \Theta(n^2)$$

A. **Arithmetic series**

B. HArmonic series

C. Geometric series

D. none

**Correct Option :** **A**

**Question No:** **29** Figure shows,___

$$\sum_{i=1}^{n} i^2 = 1+4+9+\ldots+n^2$$
$$= \frac{2n^3+3n^2+n}{6} = \Theta(n^3)$$

A. Arithmatic series

B. **Quadratic series**

C. Harmonic series

D. Geometric series

**Correct Option :** **B**

**Question No:** **30** Figure shows …….. and If 0 < x < 1 then this is Θ(1), and if x > 1, then this is Θ(x^n).___

$$\sum_{i=1}^{n} x^i = 1+x+x^2+\ldots+x^n$$
$$= \frac{x^{(n+1)}-1}{x-1} = \Theta(n^2)$$

A. Quadratic series

B. Arithmatic series

C. **Geometric series**

D. Harmonic series

**Correct Option :** **C**

**Question No:** **31** For n ≥ 0 , figure shows …___

$$H_n = \sum_{i=1}^{n} \frac{1}{i}$$
$$= 1+\frac{1}{2}+\frac{1}{3}+\ldots+\frac{1}{n} \approx \ln n$$
$$= \Theta(\ln n)$$

A. Geometric series

B. Quadratic series

C. Arithmetic series

D. **Harmonic series**

**Correct Option :** **D**

**Question No:** **32** We write out the loops as summations and then solve the summations. ___

A. **true**

B. false

**Correct Option :** **A**

**Question No:** **33** A point p is said to dominated by point q if p.x ≤ q.x and p.y ≤ q.y___

A. **true**

B. false

**Correct Option :** **A**

**Question No:** **34** We introduced a brute-force algorithm that ran in _________

A. Θ(n) time

B. **Θ(n^2) time**

C. Θ(nlogn) time

D. Θ(n^3) time

**Correct Option :** **B**

**Question No:** **35** The problem with the brute-force algorithm is that it uses ________ in pruning out decisions.___

A. intelligence

B. **no intelligence**

**Correct Option :** **B**

**Question No:** **36** This follows from the fact that dominance relation is ____________

A. symmetric.

B. **transitive.**

C. non-transitive.

**Correct Option :** **B**

**Question No:** **37** This approach of solving geometric problems by sweeping a line across the plane is called ___________

A. **plane sweep.**

B. brute force.

**Correct Option :** **A**

**Question No:** **38** Sorting takes ___________ time.___

A. Θ(n)

B. $\Theta(n^2)$

C. **$\Theta(n \log n)$**

D. none

**Correct Option : C**

**Question No: 39** Plane-sweep Algorithm, the inner while-loop _______ execute more than n times over the entire course of the algorithm.___

A. can

B. **cannot**

**Correct Option : B**

**Question No: 40** The runtime of entire plane-sweep algorithm is $\Theta(n \log n)$___

A. **true**

B. false

**Correct Option : A**

**Question No: 41** For n = 1, 000, 000, if plane-sweep takes 1 second, the brute-force will take about ___

A. 14 hours

B. 14 minutes

**Correct Option : A**

**Question No: 42** If n is not very large, then almost any algorithm _____ be fast.___

A. may

B. may be not

C. **will**

D. none

**Correct Option : C**

**Question No: 43** Given any function g(n), we define $\Theta(g(n))$ to be a set of functions that asymptotically equivalent to g(n). Formally:___

$$\Theta(g(n)) = \{f(n) \mid \text{there exist positive constants } c_1, c_2 \text{ and } n_0 \text{ such that } 0 \le c_1 g(n) \le f(n) \le c_2 g(n) \text{ for all } n \ge n_0\}$$

A. **true**

B. false

**Correct Option : A**

**Question No: 44** This is written as “f(n) E Θ(g(n))” That is, f(n) and g(n) are asymptotically equivalent. This means that they have essentially the _______ growth rates for large n. ___

A. different

B. **same**

**Correct Option : B**

**Question No: 45** All given function are all asymptotically equivalent. As n becomes large, the dominant (fastest growing) term is some constant times n^2.___

- $4n^2$,
- $(8n^2 + 2n - 3)$,
- $(n^2/5 + \sqrt{n} - 10 \log n)$
- $n(n - 3)$

A. **true**

B. false

**Correct Option : A**

**Question No: 46** Lower bound f(n) = 8n2 + 2n − 3 grows asymptotically at least as fast as n^2,___

A. **true**

B. false

**Correct Option : A**

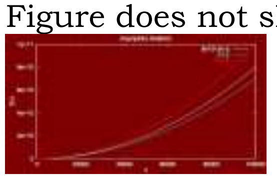
**Question No: 47** Upper bound f(n) grows no faster asymptotically than n^2,___

A. **true**

B. false

**Correct Option : A**

**Question No: 48** Figure does not show  Asymptotic Notation Example___



A. true

B. **false**

**Correct Option : B**

**Question No: 49** The ____________ is used to state only the asymptotic upper bounds.___

$$O(g(n)) = \{f(n) \mid \text{there exist positive constants } c \text{ and } n_0 \text{ such that } 0 \le f(n) \le cg(n) \text{ for all } n \ge n_0\}$$

A. theta notation

B. **O-notation**

C. Ω-notation

**Correct Option :** **B**

**Question No: 50** The ________allows us to state only the asymptotic lower bounds.___

$$\Omega(g(n)) = \{f(n) \mid \text{there exist positive constants } c \text{ and } n_0 \text{ such that } 0 \le cg(n) \le f(n) \text{ for all } n \ge n_0\}$$

A. **Ω-notation**

B. O-notation

**Correct Option :** **A**

**Question No: 51** The three notations:

___

$$\Theta(g(n)): 0 \le c_1 g(n) \le f(n) \le c_2 g(n)$$
$$O(g(n)): 0 \le f(n) \le cg(n)$$
$$\Omega(g(n)): 0 \le cg(n) \le f(n)$$
$$\text{for all } n \ge n_0$$

A. **true**

B. false

**Correct Option :** **A**

**Question No: 52** Limit rule for Θ-notation:___

$$\lim_{n\to\infty} \frac{f(n)}{g(n)} = c,$$

A. **true**

B. false

**Correct Option :** **A**

**Question No: 53** The limit rule for O-notation is ___

$$\lim_{n\to\infty} \frac{f(n)}{g(n)} = c,$$

A. **true**

B. false

**Correct Option :** **A**

**Question No: 54** limit rule for Ω-notation:___

$$\lim_{n \to \infty} \frac{f(n)}{g(n)} \neq 0,$$

A. **true**

B. false

**Correct Option :** **A**

**Question No:** **55** Here is a list of common asymptotic running times:
• Θ(1): Constant time; can't beat it!
• Θ(log n): Inserting into a balanced binary tree; time to find an item in a sorted array of length n using binary search.
• Θ(n): About the fastest that an algorithm can run.
• Θ(n log n): Best sorting algorithms.
• Θ(n2), Θ(n3): Polynomial time. These running times are acceptable when the exponent of n is small or n is not to large, e.g., n ≤ 1000.
• Θ(2n), Θ(3n): Exponential time. Acceptable only if n is small, e.g., n ≤ 50.
• Θ(n!), Θ(nn): Acceptable only for really small n, e.g. n ≤ 20___

A. **true**

B. false

**Correct Option :** **A**

**Question No:** **56** Ancient Roman politicians followed an important principle of good algorithm design known as Divide and Conquer Strategy.___

A. **true**

B. false

**Correct Option :** **A**

**Question No:** **57** The main elements to a divide-and-conquer solution are___

A. Divide: the problem into a small number of pieces

B. Conquer: solve each piece by applying divide and conquer to it recursively

C. Combine: the pieces together into a global solution

D. **All of the above.**

**Correct Option :** **D**

**Question No:** **58** The merge sort algorithm works by ________

A. (Divide:) split A down the middle into two subsequences, each of size roughly n/2

B. (Conquer:) sort each subsequence by calling merge sort recursively on each.

C. (Combine:) merge the two sorted subsequences into a single sorted list.

D. **All of the above.**

**Correct Option : D**

**Question No: 59** MERGE-SORT( array A, int p, int r)
1 if (p < r)
2 then
3 q ← (p + r)/2
4 MERGE-SORT(A, p, q) // sort A[p..q]
5 MERGE-SORT(A, q + 1, r) // sort A[q + 1..r]
6 MERGE(A, p, q, r) // merge the two pieces___

A. **true**

B. false

**Correct Option : A**

**Question No: 60** The iteration method does not turn the recurrence into a summation___

$$T(n) = \begin{cases} 1 & \text{if } n = 1, \\ T(\lceil n/2 \rceil) + T(\lfloor n/2 \rfloor) + n & \text{otherwise} \end{cases}$$

A. **false**

B. true

**Correct Option : A**

**Question No: 61** Define the ______ of an element to be one plus the number of elements that are smaller. ___

A. **Rank**

B. Degree

**Correct Option : A**

**Question No: 62** Thus, the rank of an element is its final position if the set is

A. **sorted**.

B. unsorted.

C. unchanged.

D. same

**Correct Option : A**

**Question No: 63** The minimum is of rank ____ and the maximum is of rank

___.___

A. 0 , 1

B. 0 , n

C. **1 , n**

D. none

**Correct Option : C**

**Question No: 64** Test___

A. Choice 1

B. Choice 2

C. Choice 3

D. **None**

**Correct Option : D**

**Question No: 65** Floor and ceilings ________ a pain to deal with.___

A. are not

B. **are**

C. sometime

D. none

**Correct Option : B**

**Question No: 66** Iteration _______ powerful technique for solving recurrences___

A. is a not a

B. might be

C. **is a very**

**Correct Option : C**

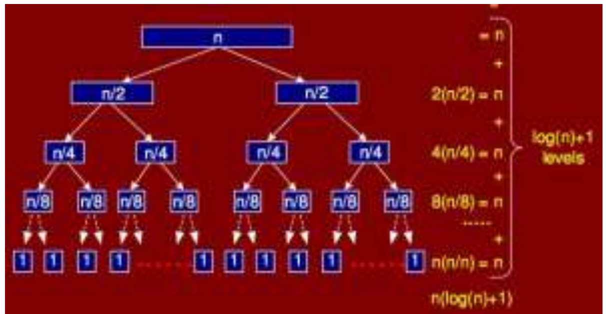
**Question No: 67** Merge of two lists of size m/2 to a list of size m takes Θ(m) time, which we will just write as m.___

A. True

B. False

**Correct Option : A**

**Question No: 68** The figure is a___




A. **Selection sort Recurrence Tree**

B. Merge sort Recurrence Tree

C. Both

D. None

**Correct Option :** **A**

**Question No: 69** Define the ______ of an element to be one plus the number of elements that are smaller.___

A. degree

B. **rank**

C. frequency

D. weight

**Correct Option :** **B**

**Question No: 70** The rank of an element is its final position if the set is sorted___

A. **true**

B. false

**Correct Option :** **A**

**Question No: 71** Consider the set: {5, 7, 2, 10, 8, 15, 21, 37, 41}. The rank of each number is its position in the sorted order.
For example, rank of 8 is ______ , one plus the number of elements ________ 8 which is 3___

| position | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Number | 2 | 5 | 7 | 8 | 10 | 15 | 21 | 37 | 41 |

A. 3 , equal to

B. 4 , greater then

C. 3 , smaller then

D. **4 , smaller then**

**Correct Option :** **D**

**Question No:** **72** Given a set A of n distinct numbers and an integer k, 1 ≤ k ≤ n, output the element of A of rank k.This problem is of type ______________

A. Merge Sort

B. **Selection Sort**

C. Maximal

**Correct Option :** **B**

**Question No:** **73** If n is odd then the median is defined to be element of rank ______.___

A. n

B. n-1

C. **(n+1)/2**

D. n/2

**Correct Option :** **C**

**Question No:** **74** When n is even, for median , there are two choices: ___

A. n/2

B. (n + 1)/2

C. **n/2 and (n + 1)/2.**

D. none

**Correct Option :** **C**

**Question No:** **75** Medians are useful as a measures of the ____________ of a set

A. mode

B. average

C. probability

D. **central tendency**

**Correct Option :** **D**

**Question No:** **76** Central tendency of a set is useful when the distribution of values is __________.___

A. skewed

B. not skewed

C. **highly skewed**

D. straight

**Correct Option :** **C**

**Question No:** **77** The median income in a community is a more meaningful measure than average. Suppose 7 households have monthly incomes 5000, 7000, 2000, 10000, 8000, 15000 and 16000. In sorted order, the incomes are 2000, 5000, 7000, 8000, 10000, 15000, 16000. The median income is 8000; median is element with rank 4: (7 + 1)/2 = 4. The average income is 9000. Suppose the income 16000 goes up to 450,000. The median is still 8000 but the average goes up to 71,000. Clearly, the average is not a good representative of the majority income levels.___

A. **Above statement is true**

B. Above statement is false

**Correct Option :** **A**

**Question No:** **78** Sorting requires _________ time___

A. Θ(log n)

B. Θ(n*2 log n)

C. **Θ(n log n)**

D. Θ(n)

**Correct Option :** **C**

**Question No:** **79** In particular, is it possible to solve the selections problem in Θ(n) time?___

A. no.

B. yes.

C. **yes. However, the solution is far from obvious**

**Correct Option :** **C**

**Question No:** **80** A very important special case of divide-and-conquer, which I call the sieve technique.___

A. false

B. **true**

**Correct Option :** **B**

**Question No:** **81** We think of divide-and-conquer as breaking the problem into a small number of bigger sub-problems, which are then solved recursively.___

A. **true**

B. false

**Correct Option : A**
**Question No: 82** The sieve technique is a special case, where the number of sub-problems is _____ .___

A. 3

B. 2

C. **just 1**

D. 0

**Correct Option : C**
**Question No: 83** In particular "large enough" means that the number of items is at least some fixed constant fraction of n (e.g. n/2, n/3). ___

A. **true**

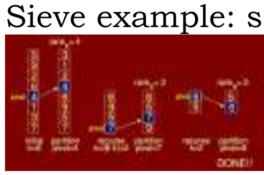
B. false

**Correct Option : A**
**Question No: 84** The following figure shows a partitioned array:___


A. **true**

B. false

**Correct Option : A**
**Question No: 85** Sieve example: select 6th smallest element is shown in fig___



A. **true**

B. false

**Correct Option : A**
**Question No: 86** Ideally, x (pivot) should have a rank that is neither too large or too small.___

A. **true**

B. false

**Correct Option :** **A**

**Question No:** **87** In sorting, we are given an array A[1..n] of n numbers We are to reorder these elements into increasing (or decreasing) order.___

A. false

B. **true**

**Correct Option :** **B**

**Question No:** **88** More generally, A is an array of objects and we sort them based on one of the attributes - the key value.___

A. **true**

B. false

**Correct Option :** **A**

**Question No:** **89** There are a number of well-known _________ O(n^2) sorting algorithms.___

A. fast

B. **slow**

**Correct Option :** **B**

**Question No:** **90** Scan the array. Whenever two consecutive items are found that are out of order, swap them. Repeat until all consecutive items are in order. It is called ______________

A. Insertion sort

B. **Bubble sort**

C. Selection sort

D. none

**Correct Option :** **B**

**Question No:** **91** Assume that A[1..i − 1] have already been sorted. Insert A[i] into its proper position in this sub array. Create this position by shifting all larger elements to the right.It is called

________________

A. Bubble sort

B. Selection sort

C. Merge sort

D. **none**

**Correct Option :** **D**

**Question No:** **92** Assume that A[1..i − 1] contain the i − 1 smallest elements in sorted order. Find the smallest element in A[i..n] Swap it with

A[i].It is called ____________

A. **Selection sort**

B. Insertion sort

C. Merge sort

D. Bubble sort

**Correct Option :** **A**

**Question No:** **93** Assume that A[1..i − 1] have already been sorted. Insert A[i] into its proper position in this sub array. Create this position by shifting all larger elements to the right.___

A. Selection sort

B. Bubble sort

C. Merge sort

D. **Insertion sort**

**Correct Option :** **D**

**Question No:** **94** In the worst case time ________ run in Θ(n2)___

A. Bubble sort

B. Selection sort

C. Insertion sort

D. **All of the above**

**Correct Option :** **D**

**Question No:** **95** A _________ is a left-complete binary tree that conforms to the heap order.___

A. BST

B. AVL Tree

C. Perfect tree

D. **Heap**

**Correct Option :** **D**

**Question No:** **96** The heap order property stated that in a __________ , for every node X, the key in the parent is smaller than or equal to the key in X.___

A. (max) heap

B. **(min) heap**

**Correct Option :** **B**

**Question No: 97** In a _______ heap, the parent has a key larger than or equal both of its children ___

A. **(max) heap**

B. (min) heap

**Correct Option :** **A**

**Question No: 98** Thus the smallest key is in the root in a_________ ; in the _________the largest is in the root.___

A. max heap, min heap

B. **min heap , max heap**

C. max heap , max heap

D. min heap , min heap

**Correct Option :** **B**

**Question No: 99** The number of nodes in a complete binary tree of height h is___

$$n = 2^0 + 2^1 + 2^2 + \cdots + 2^h = \sum_{i=0}^{h} 2^i = 2^{h+1} - 1$$

A. **true**

B. false

**Correct Option :** **A**

**Question No: 100** h in terms of n is___

$$h = (\log(n+1)) - 1 \approx \log n \in \Theta(\log n)$$

A. **true**

B. false

**Correct Option :** **A**

**Question No: 101** One of the clever aspects of ________ is that they can be stored in arrays without using any pointers___

A. lists

B. BST trees

C. **heaps**

**Correct Option :** **C**

**Question No: 102** We store the tree nodes in level-order traversal in heap sort___

A. **true**

B. false

**Correct Option : A**

**Question No: 103** Access to nodes involves simple arithmetic operations:shown in below
left(i) : returns 2i, index of left child of node i.
right(i) : returns 2i + 1, the right child.
parent(i) : returns bi/2c, the parent of i.___

A. false

B. **true**

**Correct Option : B**

**Question No: 104** The root is at position 1 of the array.___

A. **true**

B. false

**Correct Option : A**

**Question No: 105** There is one principal operation for maintaining the heap property.___

A. **Heapify Procedure**

B. none

**Correct Option : A**

**Question No: 106** It is called Heapify. (In other books it is sometimes called sifting down.) ___

A. **true**

B. false

**Correct Option : A**

==========================================================>

**MCQz (Set-2) Lecture wise MCQs**

Correct Choice : 4 From Lectuer # 1
3 - _______________ is a graphical representation of an algorithm
1. Segma Notation
2. Thita Notation
**3. Flowchart**
4. Asymptotic notation
Correct Choice : 3 From Lectuer # 2
4 - What will be the total number of max comparisons if we run brute-force maxima algorithm with n elements?
**1. n^2**
2. n^n/2

3. n
4. n^8
Correct Choice : 1 From Lectuer # 3
5 - function is given like 4n^4+ 5n^3+n what is the run time of this
**1. theata(n^4)**
2. theata(n^3)
3. theata(4n^4+ 5n^3)
4. theata(4n^4+ 5n^3)
Correct Choice : 1 From Lectuer # 4
6 - Consider the following
code: For(j=1; j
7 - Execution of the following code fragment
int i = N; while (i > 0)
2
{ int Sum = 0; int j;
for (j = 0; j Sum++;
cout
8 - Let us say we have an algorithm that carries out N2 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?
1. 90 seconds
**2. 9 seconds**
3. 0.9 seconds
4. 0.09 seconds
Correct Choice : 2 From Lectuer # 4
9 - The appropriate big thita classification of the given function. f(n) = 4n2 + 97n + 1000 is
1. ?(n)
2. O(2^n)
**3. O(n^2)**
4. O(n^2logn)
Correct Choice : 3 From Lectuer # 4
10 - The appropriate big ? classification of the given function. f(n) = 4n2 + 97n + 1000 is
1. ?(n)
2. O(2^n)
**3. O(n^2)**
4. O(n^2logn)
Correct Choice : 3 From Lectuer # 4
11 - Which sorting algorithm is faster
1. O (n log n)
2. O n^2
**3. O (n+k)**
4. O n^3
Correct Choice : 3 From Lectuer # 5
12 - If algorithm A has running time 7n^2 + 2n + 3 and algorithm B has running time 2n^2,then
**1. Both have same asymptotic time complexity**
2. A is asymptotically greater
3. B is asymptotically greater

4. None of others
Correct Choice : 1 From Lectuer # 6
14 - What is the solution to the recurrence T(n) = T(n/2)+n .
**1. O(logn)**
2. O(n)
3. O(nlogn)
4. O(n^2)
Correct Choice : 1 From Lectuer # 8
15 - How much time merge sort takes for an array of numbers?
1. (n^2)
**2. T(n)**
3. T( log n)
4. T(n log n)
Correct Choice : 2 From Lectuer # 8
17 - Consider the following Algorithm:
Factorial (n){ if (n=1)
return 1 else return (n *
Factorial(n-1))
} Recurrence for the following algorithm is:
1. T(n) = T(n-1) +1
2. T(n) = nT(n-1) +1
3. T(n)= T(n-1) +n
**4. T(n)=T(n(n-1)) +1**
Correct Choice : 4 From Lectuer # 9
18 - For the Sieve Technique we take time
**1. T(nk) .**
2. T(n / 3) 4
3. n^2
4. n/3
Correct Choice : 1 From Lectuer # 10
20 - Sieve Technique applies to problems where we are interested in finding a single item from a larger set of _____________
**1. n items**
2. phases
3. pointers
4. constant
Correct Choice : 1 From Lectuer # 10
22 - In Sieve Technique we do not know which item is of interest
1. FALSE
**2. TRUE**
3.
4.
Correct Choice : 2 From Lectuer # 10
23 - For the sieve technique we solve the problem,
**1. recursively**
2. mathematically
3. accurately
4. precisely
Correct Choice : 1 From Lectuer # 10

24 - For the Sieve Technique we take time
**1. T(nk)**
2. T(n / 3)
3. n^2
4. n/3
Correct Choice : 1 From Lectuer # 10
25 - How many elements do we eliminate in each time for the Analysis of Selection algorithm?
1. n / 2 elements
2. (n / 2) + n elements
3. n / 4 elements
**4. n elements**
5
Correct Choice : 4 From Lectuer # 10
26 - Sieve Technique applies to problems where we are interested in finding a single item from a larger set of _____________
**1. n items**
2. phases
3. pointers
4. constant
Correct Choice : 1 From Lectuer # 10
27 - Sieve Technique can be applied to selection problem?
1. TRUE
2. FALSE
3.
4.
Correct Choice : 1 From Lectuer # 10
28 - The analysis of Selection algorithm shows the total running time is indeed ________in n,
1. arithmetic
2. geometric
**3. linear**
4. orthogonal
Correct Choice : 3 From Lectuer # 10
29 - The reason for introducing Sieve Technique algorithm is that it illustrates a very important special case of,
**1. divide-and-conquer**
2. decrease and conquer
3. greedy nature
4. 2-dimension Maxima
Correct Choice : 1 From Lectuer # 10
30 - The sieve technique works in ___________ as follows
**1. phases**
2. numbers
3. integers
4. routines
Correct Choice : 1 From Lectuer # 10
31 - The sieve technique works in ___________ as follows
**1. phases 6**

2. numbers
3. integers
4. routines
Correct Choice : 1 From Lectuer # 10
32 - A (an) _________ is a left-complete binary tree that conforms to the heap order
1. heap
2. binary tree
3. binary search tree
4. array
Correct Choice : 1 From Lectuer # 11
34 - For the heap sort, access to nodes involves simple _______________ operations.
**1. arithmetic**
2. binary
3. algebraic
4. logarithmic
Correct Choice : 1 From Lectuer # 11
37 - We do sorting to,
**1. keep elements in random positions**
2. keep the algorithm run in linear order
3. keep the algorithm run in (log n) order
4. keep elements in increasing or decreasing order
Correct Choice : 1 From Lectuer # 11
42 - For the heap sort we store the tree nodes in
**1. level-order traversal**
2. in-order traversal
3. pre-order traversal
4. post-order traversal
Correct Choice : 1 From Lectuer # 11
7
44 - In the analysis of Selection algorithm, we make a number of passes, in fact it could be as
many as,
1. T(n)
2. T(n / 2)
**3. log n**
4. n / 2 + n / 4
Correct Choice : 3 From Lectuer # 11
45 - In the analysis of Selection algorithm, we make a number of passes, in fact it could be as
many as,
1. T(n)
2. T(n / 2)
**3. log n**
4. n / 2 + n / 4
Correct Choice : 3 From Lectuer # 11
46 - In which order we can sort?
1. increasing order only
2. decreasing order only
**3. increasing order or decreasing order**

4. both at the same time
Correct Choice : 3 From Lectuer # 11
47 - One of the clever aspects of heaps is that they can be stored in arrays without using any _______________.
**1. pointers**
2. constants
3. variables
4. functions
Correct Choice : 1 From Lectuer # 11
49 - Slow sorting algorithms run in,
**1. O(n^2)**
2. O(n)
3. O( log n)
4. O(n log n)
Correct Choice : 1 From Lectuer # 11
50 - What is the total time to heapify?
**1. ?(log n)**
2. ?(n log n)
3. ?(n^2 log n)
4. ?(log^2n)
Correct Choice : 1 From Lectuer # 12
-When we call heapify then at each level the comparison performed takes time It will take O (1)
1. Time will vary according to the nature of input data
2. It can not be predicted
**3. It will take O (log n)**
4. None of the Given
Correct Choice : 3 From Lectuer # 12
53 - After partitioning array in Quick sort, pivot is placed in a position such that
1. Values smaller than pivot are on left and larger than pivot are on right
**2. Values larger than pivot are on left and smaller than pivot are on right**
3. Pivot is the first element of array
4. Pivot is the last element of array
Correct Choice : 2 From Lectuer # 13
54 - The running time of quick sort depends heavily on the selection of
1. No of inputs
2. Arrangement of elements in array
3. Size o elements
**4. Pivot element**
Correct Choice : 4 From Lectuer # 13
55 - In Quick Sort Constants hidden in T(n log n) are
1. Large
2. Medium
**3. Small**
4. Not Known
Correct Choice : 3 From Lectuer # 14
9
56 - In Quick Sort Constants hidden in T(n log n) are
1. Large

2. Medium
**3. Small**
4. Not Known
Correct Choice : 3 From Lectuer # 14
57 - Is it possible to sort without making comparisons?
**1. Yes**
2. No
3.
4.
Correct Choice : 1 From Lectuer # 15
58 - Merge sort is stable sort, but not an in-place algorithm
**1. TRUE**
2. FALSE
3.
4.
Correct Choice : 1 From Lectuer # 15
59 - In counting sort, once we know the ranks, we simply _________ numbers to their final positions in an output array.
1. Delete
**2. Copy**
3. Mark
4. arrange
Correct Choice : 2 From Lectuer # 15
60 - An in place sorting algorithm is one that uses ___ arrays for storage
1. Two dimensional arrays
2. More than one array
**3. No Additional Array**
4. None of the above
Correct Choice : 3 From Lectuer # 15
61 - Continuation/counting sort is suitable to sort the elements in range 1 to k
1. K is Large
2. K is not known
3. K may be small or large
**4. K is small**
10
Correct Choice : 4 From Lectuer # 15
62 - In stable sorting algorithm.
**1. If duplicate elements remain in the same relative position after sorting**
2. One array is used
3. More than one arrays are required
4. Duplicating elements not handled
Correct Choice : 1 From Lectuer # 15
63 - One example of in place but not stable algorithm is
1. Merger Sort
**2. Quick Sort**
3. Continuation Sort
4. Bubble Sort
Correct Choice : 2 From Lectuer # 15
64 - One example of in place but not stable algorithm is

1. Merger Sort
**2. Quick Sort**
3. Continuation Sort
4. Bubble Sort
Correct Choice : 2 From Lectuer # 15
65 - One of the clever aspects of heaps is that they can be stored in arrays without using any _______________.
**1. pointers**
2. constants
3. variables
4. functions
Correct Choice : 1
66 - Quick sort is
1. Stable & in place
2. Not stable but in place
**3. Stable but not in place**
4. Some time stable & some times in place
Correct Choice : 3 From Lectuer # 15
67 - Quick sort is
1. Stable & in place
**2. Not stable but in place**
3. Stable but not in place
4. Some time stable & some times in place
Correct Choice : 2 From Lectuer # 15
68 - Which may be a stable sort?
1. Merger
2. Insertion
**3. Both above**
4. None of the above
Correct Choice : 3 From Lectuer # 15
69 - Which of the following sorting algorithms is stable?
(i) Merge sort,
(ii) Quick sort,
(iii) Heap sort,
(iv) Counting Sort.
**1. Only i**
2. Only ii
3. Both i and ii
4. Both iii and iv
Correct Choice : 1 From Lectuer # 15
70 - Which of the following sorting algorithms is stable?
(i) Merge sort,
(ii) Quick sort,
(iii) Heap sort,
(iv) Counting Sort.
**1. Only i**
2. Only ii
3. Both i and ii
4. Both iii and iv

Correct Choice : 1 From Lectuer # 15
71 - Mergesort is a stable algorithm but not an in-place algorithm.
**1. TRUE**
2. FALSE
3.
4.
Correct Choice : 1 From Lectuer # 16
72 - Memorization is?
1. To store previous results for future use
**2. To avoid this unnecessary repetitions by writing down the results of recursive**
12
calls and looking them up again if we need them later
3. To make the process accurate
4. None of the above
Correct Choice : 2 From Lectuer # 16
73 - Dynamic programming algorithms need to store the results of intermediate sub-problems.
**1. TRUE**
2. FALSE
3.
4.
Correct Choice : 1 From Lectuer # 17
74 - Dynamic programming uses a top-down approach.
1. TRUE
**2. FALSE**
3.
4.
Correct Choice : 2 From Lectuer # 17
75 - The edit distance between FOOD and MONEY is
**1. At most four**
2. At least four
3. Exact four
4. Wrong
Correct Choice : 1 From Lectuer # 17
76 - The edit distance between FOOD and MONEY is
**1. At most four**
2. At least four
3. Exact four
4. Wrong
Correct Choice : 1 From Lectuer # 17
77 - If there are O (n^2) entries in edit distance matrix then the total running time is
1. O (1)
**2. O (n^2)**
3. O (n)
4. O (n log n)
Correct Choice : 2 From Lectuer # 18
13
79 - A p x q matrix A can be multiplied with a q x r matrix B. The result will be a p x r matrix

C. There are (p . r) total entries in C and each takes _________ to compute.
**1. O (q)**
2. O (1)
3. O (n^2)
4. O (n^3)
Correct Choice : 1 From Lectuer # 19
80 - For Chain Matrix Multiplication we can not use divide and conquer approach because,
**1. We do not know the optimum k**
2. We use divide and conquer for sorting only
3. We can easily perform it in linear time
4. Size of data is not given
Correct Choice : 1 From Lectuer # 19
82 - A p x q matrix A can be multiplied with a q x r matrix B. The result will be a p x r matrix
C. There are (p . r) total entries in C and each takes _________ to compute.
**1. O (q)**
2. O (1)
3. O (n^2)
4. O (n^3)
Correct Choice : 1 From Lectuer # 19
83 - The Knapsack problem belongs to the domain of _______________ problems.
**1. Optimization**
2. NP Complete
3. Linear Solution
4. Sorting
Correct Choice : 1 From Lectuer # 21
84 - 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
1. Items 1 and 2
2. Items 1 and 3
3. Items 2 and 3
**4. None of these**
14
Correct Choice : 4 From Lectuer # 22
Correct Choice : 3 From Lectuer # 21
85 - Huffman algorithm uses a greedy approach to generate a postfix code T that minimizes the expected length B (T) of the encoded string.
**1. TRUE**
2. FALSE
3.
4.
Correct Choice : 1 From Lectuer # 22
86 - The codeword assigned to characters by the Huffman algorithm have the property that no codeword is the postfix of any other.
1. TRUE
**2. FALSE**
3.

4.
Correct Choice : 2 From Lectuer # 22
87 - The greedy part of the Huffman encoding algorithm is to first find two nodes with larger frequency.
1. TRUE
**2. FALSE**
3.
4.
Correct Choice : 2 From Lectuer # 22
88 - An optimization problem is one in which you want to find,
1. Not a solution
2. An algorithm
3. Good solution
**4. The best solution**
Correct Choice : 4 From Lectuer # 22

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**MCQz (Set-3)**

Q What type of instructions Random access machine can execute? Choose best answer.
Geometric and arithmetic
Algebraic and logic
**Arithmetic and logic**
Parallel and recursive

Q Due to left complete nature of binary tree, the heap can be stored in
- **Arrays**
- Structures
- Link Lis
- Stack

Q 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

Q 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

Q knapsack problem is called a “0-1” problem, because

????????????????????

**Each item must be entirely accepted or rejected**
????????????????????
??????????????????????
Q word Algorithm comes from the name of the muslim author **Abu Ja'far Mohammad ibn Musa al-Khowarizmi**.
Q al-Khwarizmi's work was written in a book titled **al Kitab al-mukhatasar fi hisab al-jabr wa'l-muqabalah**

Q What is the total time to heapify?
• **O(log n)**
• O(n log n)
• O(n2 logn)
• O(log2n)
============================================================>

**MCQz (Set-4)**

1. For the Sieve Technique we take time
> **T(nk)** .
>T(n / 3)
>n^2
>n/3
2. Sieve Technique applies to problems where we are interested in finding a single item from a larger set of ____________
Select correct option:
**>n items**
>phases
>pointers
>constant
3. _____________ graphical representation of algorithm.
> asymptotic
**>. flowchart**
4. who invented the quick sort
5. function is given like 4n^4+ 5n^3+n what is the run time of this
**>theata(n^4)**
>theata(n^3)
>theata(4n^4+ 5n^3)
> theata(4n^4+ 5n^3)
6. main elements to a divide-and-conquer
**Divide---->conquer---------->combine**
7. T(n)={4 if n=1, otherwise T(n/5)+3n^2
what is the answer if n=5
**answer is 79**
8. Mergesort is a stable algorithm but not an in-place algorithm.
**>True**
>false
9. Counting sort the numbers to be sorted are in the range 1 to k where k is small.

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**MCQz (Set-5)**

Question # 1 of 10 ( Start time: 06:18:58 PM ) Total Marks: 1
We do sorting to,
Select correct option:
keep elements in random positions
keep the algorithm run in linear order
keep the algorithm run in (log n) order
**keep elements in increasing or decreasing order**

Question # 2 of 10 ( Start time: 06:19:38 PM ) Total Marks: 1
Heaps can be stored in arrays without using any pointers; this is due to the ____________ nature of the binary tree,
Select correct option:
**left-complete**
right-complete
tree nodes
tree leaves

Question # 3 of 10 ( Start time: 06:20:18 PM ) Total Marks: 1
Sieve Technique can be applied to selection problem?
Select correct option:
**True**
False

Question # 4 of 10 ( Start time: 06:21:10 PM ) Total Marks: 1
A heap is a left-complete binary tree that conforms to the ___________
Select correct option:
increasing order only
decreasing order only
**heap order**
(log n) order

Question # 5 of 10 ( Start time: 06:21:39 PM ) Total Marks: 1
A (an) _________ is a left-complete binary tree that conforms to the heap order
Select correct option:
**heap**
binary tree
binary search tree
array

Question # 6 of 10 ( Start time: 06:22:04 PM ) Total Marks: 1
Divide-and-conquer as breaking the problem into a small number of
Select correct option:
pivot
Sieve
**smaller sub problems**

Selection

Question # 7 of 10 ( Start time: 06:22:40 PM ) Total Marks: 1
In Sieve Technique we do not know which item is of interest
Select correct option:
**True**
False

Question # 8 of 10 ( Start time: 06:23:26 PM ) Total Marks: 1
The recurrence relation of Tower of Hanoi is given below T(n)={1 if n=1 and 2T(n-1) if n >1
In order to move a tower of 5 rings from one peg to another, how many ring moves are required?
Select correct option:
16
10
**32**
31
Question # 9 of 10 ( Start time: 06:24:44 PM ) Total Marks: 1
In the analysis of Selection algorithm, we eliminate a constant fraction of the array with each phase; we get the convergent _______________ series in the analysis,
Select correct option:
linear
arithmetic
**geometric**
exponent

Question # 10 of 10 ( Start time: 06:25:43 PM ) Total Marks: 1
For the heap sort, access to nodes involves simple _______________ operations.
Select correct option:
**arithmetic**
binary
algebraic
logarithmic

=======================================================>

**MCQz (Set-6)**

1. For the sieve technique we solve the problem,
- **recursively**
- mathematically
- precisely
- accurately

2. We do sorting to,
- keep elements in random positions
- keep the algorithm run in linear order
- keep the algorithm run in (log n) order
- **keep elements in increasing or decreasing order**

3. The reason for introducing Sieve Technique algorithm is that it illustrates a very important special case of,
☐ **divide-and-conquer**
☐ decrease and conquer
☐ greedy nature
☐ 2-dimension Maxima
4. In Sieve Technique we do not know which item is of interest
☐ **True**
☐ False
5. In the analysis of Selection algorithm, we make a number of passes, in fact it could be as many as,
☐ T(n)
☐ T(n / 2)
☐ **log n**
☐ n / 2 + n / 4
6. Divide-and-conquer as breaking the problem into a small number of
☐ pivot
☐ Sieve
☐ **smaller sub problems**
☐ Selection
7. A heap is a left-complete binary tree that conforms to the ___________
☐ increasing order only
☐ decreasing order only
☐ **heap order**
☐ (log n) order
8. Slow sorting algorithms run in,
☐ **T(n^2)**
☐ T(n)
☐ T( log n)
☐ T(n log n)
9. One of the clever aspects of heaps is that they can be stored in arrays without using any _______________.
☐ **pointers**
☐ constants
☐ variables
☐ functions
10. Sorting is one of the few problems where provable ________ bonds exits on how fast we can sort,
☐ upper
☐ **lower**
☐ average
☐ log n
☐ 2nd
=============================================================>

**MCQz (Set-7)**

11. For the sieve technique we solve the problem,
☐ mathematically
☐ precisely

 accurately
 **recursively**
12. Sieve Technique can be applied to selection problem?
 **true**
 false
13. How much time merge sort takes for an array of numbers?
 (n^2)
 T(n)
 T( log n)
 **T(n log n)**
14. For the Sieve Technique we take time
 **T(nk)**
 T(n / 3)
 n^2
 n/3
15. Heaps can be stored in arrays without using any pointers; this is due to the
____________ nature of the binary tree,
 **left-complete**
 right-complete
 tree nodes
 tree leaves
16. How many elements do we eliminate in each time for the Analysis of
Selection algorithm?
 n / 2 elements
 **(n / 2) + n elements**
 n / 4 elements
 2 n elements
17. We do sorting to,
 keep elements in random positions
 keep the algorithm run in linear order
 keep the algorithm run in (log n) order
 **keep elements in increasing or decreasing order**
18. In which order we can sort?
 increasing order only
 decreasing order only
 **increasing order or decreasing order**
 both at the same time
19. A heap is a left-complete binary tree that conforms to the ___________
 increasing order only
 decreasing order only
 **heap order**
 (log n) order
20. In the analysis of Selection algorithm, we make a number of passes, in
fact it could be as many as,
 T(n)
 T(n / 2)
 **log n**
 n / 2 + n / 4
=============================================================>

## MCQz (Set-8)

21. A heap is a left-complete binary tree that conforms to the ___________
- increasing order only
- decreasing order only
- **heap order**
- (log n) order

22. How much time merge sort takes for an array of numbers?
- T(n^2)
- T(n)
- **T( log n)**
- T(n log n)

23. One of the clever aspects of heaps is that they can be stored in arrays without using any _______________.
- **pointers**
- constants
- variables
- functions

24. n the analysis of Selection algorithm, we eliminate a constant fraction of the array with each phase; we get the convergent _______________ series in the analysis,
- linear
- arithmetic
- **geometric**
- exponent

25. Sieve Technique applies to problems where we are interested in finding a single item from a larger set of _____________
- **n items**
- phases
- pointers
- constant

26. A (an) _________ is a left-complete binary tree that conforms to the heap order
- **heap**
- binary tree
- binary search tree
- array

27. The sieve technique works in ___________ as follows
- **phases**
- numbers
- integers
- routines

28. For the sieve technique we solve the problem,
- **recursively**
- mathematically
- precisely
- accurately

29. For the heap sort, access to nodes involves simple _______________ operations.
- ☐ **arithmetic**
- ☐ binary
- ☐ algebraic
- ☐ logarithmic

30. The analysis of Selection algorithm shows the total running time is indeed ________in n,\
- ☐ arithmetic
- ☐ geometric
- ☐ **linear**
- ☐ orthogonal

==========================================================>

## MCQz (Set-9)

Question # 1 of 10 ( Start time: 07:39:23 AM ) Total Marks: 1
For the sieve technique we solve the problem,
Select correct option:
- ☐ **recursively**
- ☐ mathematically
- ☐ precisely
- ☐ accurately

Question # 2 of 10 ( Start time: 07:40:32 AM ) Total Marks: 1
For the heap sort, access to nodes involves simple _______________ operations.
Select correct option:
- ☐ **arithmetic**
- ☐ binary
- ☐ algebraic
- ☐ logarithmic

Question # 3 of 10 ( Start time: 07:41:58 AM ) Total Marks: 1
We do sorting to,
Select correct option:
- ☐ keep elements in random positions
- ☐ keep the algorithm run in linear order
- ☐ keep the algorithm run in (log n) order
- ☐ **keep elements in increasing or decreasing order**

Question # 4 of 10 ( Start time: 07:42:18 AM ) Total Marks: 1
One of the clever aspects of heaps is that they can be stored in arrays without using any _______________.
Select correct option:
- ☐ **pointers**
- ☐ constants
- ☐ variables
- ☐ functions

Question # 5 of 10 ( Start time: 07:42:55 AM ) Total Marks: 1
A (an) _________ is a left-complete binary tree that conforms to the heap order
Select correct option:
□ **heap**
□ binary tree
□ binary search tree
□ array

Question # 6 of 10 ( Start time: 07:43:24 AM ) Total Marks: 1
The analysis of Selection algorithm shows the total running time is indeed ________in n,
Select correct option:
□ arithmetic
□ geometric
□ **linear**
□ orthogonal

Question # 7 of 10 ( Start time: 07:44:11 AM ) Total Marks: 1
Sieve Technique applies to problems where we are interested in finding a single item from a larger set of _____________
Select correct option:
□ **n items**
□ phases
□ pointers
□ constant

Question # 8 of 10 ( Start time: 07:45:06 AM ) Total Marks: 1
Divide-and-conquer as breaking the problem into a small number of
Select correct option:
□ pivot
□ Sieve
□ **smaller sub problems**
□ Selection

Question # 9 of 10 ( Start time: 07:45:36 AM ) Total Marks: 1

In Sieve Technique we do not know which item is of interest
Select correct option:
□ **True**
□ False

Question # 10 of 10 ( Start time: 07:46:17 AM ) Total Marks: 1
How much time merge sort takes for an array of numbers?
Select correct option:
□ T(n^2)
□ T(n)
□ T( log n)

☐ **T(n log n)**

=============================================================>

## MCQz (Set-10)

Question # 1 of 10 ( Start time: 07:48:31 AM ) Total Marks: 1
For the heap sort we store the tree nodes in
Select correct option:

☐ **level-order traversal**
☐ in-order traversal
☐ pre-order traversal
☐ post-order traversal

Question # 2 of 10 ( Start time: 07:48:53 AM ) Total Marks: 1
One of the clever aspects of heaps is that they can be stored in arrays without using any _______________.
Select correct option:

☐ **pointers**
☐ constants
☐ variables
☐ functions

Question # 3 of 10 ( Start time: 07:49:03 AM ) Total Marks: 1

Sorting is one of the few problems where provable ________ bonds exits on how fast we can sort,
Select correct option:

☐ upper
☐ **lower**
☐ average
☐ log n

Question # 4 of 10 ( Start time: 07:49:59 AM ) Total Marks: 1
A (an) _________ is a left-complete binary tree that conforms to the heap order
Select correct option:

☐ **heap**
☐ binary tree
☐ binary search tree
☐ array

Question # 5 of 10 ( Start time: 07:50:09 AM ) Total Marks: 1

Sieve Technique applies to problems where we are interested in finding a single item from a larger set of _____________
Select correct option:

☐ **n items**
☐ phases
☐ pointers

☐ constant

Question # 6 of 10 ( Start time: 07:50:20 AM ) Total Marks: 1
How much time merge sort takes for an array of numbers?
Select correct option:
☐ T(n^2)
☐ T(n)
☐ T( log n)
☐ **T(n log n)**

Question # 7 of 10 ( Start time: 07:50:36 AM ) Total Marks: 1
A heap is a left-complete binary tree that conforms to the ___________

Select correct option:
☐ increasing order only
☐ decreasing order only
☐ **heap order**
☐ (log n) order

Question # 8 of 10 ( Start time: 07:51:04 AM ) Total Marks: 1
In the analysis of Selection algorithm, we make a number of passes, in fact it could be as many as,
Select correct option:
☐ T(n)
☐ T(n / 2)
☐ **log n**
☐ n / 2 + n / 4

Question # 9 of 10 ( Start time: 07:51:41 AM ) Total Marks: 1
The reason for introducing Sieve Technique algorithm is that it illustrates a very important special case of,
Select correct option:

☐ **divide-and-conquer**
☐ decrease and conquer
☐ greedy nature
☐ 2-dimension Maxima

Question # 10 of 10 ( Start time: 07:52:17 AM ) Total Marks: 1
The analysis of Selection algorithm shows the total running time is indeed ________in n,
Select correct option:
☐ arithmetic
☐ geometric
☐ **linear**
☐ orthogonal
============================================================>

**MCQz (Set-11)**

Question # 1 of 10 ( Start time: 07:53:11 AM ) Total Marks: 1
The sieve technique works in ___________ as follows
Select correct option:
- **phases**
- numbers
- integers
- routines

Question # 2 of 10 ( Start time: 07:53:53 AM ) Total Marks: 1
Sorting is one of the few problems where provable ________ bonds exits on how fast we can sort,
Select correct option:
- upper
- **lower**
- average
- log n

Question # 3 of 10 ( Start time: 07:54:01 AM ) Total Marks: 1
In the analysis of Selection algorithm, we make a number of passes, in fact it could be as many as,
Select correct option:
- T(n)
- T(n / 2)
- **log n**
- n / 2 + n / 4

Question # 4 of 10 ( Start time: 07:54:16 AM ) Total Marks: 1
For the Sieve Technique we take time
Select correct option:
- **T(nk)**
- T(n / 3)
- n^2
- n/3

Question # 5 of 10 ( Start time: 07:55:31 AM ) Total Marks: 1
A (an) _________ is a left-complete binary tree that conforms to the heap order
Select correct option:
- **heap**
- binary tree
- binary search tree
- array

Question # 6 of 10 ( Start time: 07:55:40 AM ) Total Marks: 1

For the heap sort we store the tree nodes in
Select correct option:
□ **level-order traversal**
□ in-order traversal
□ pre-order traversal
□ post-order traversal

Question # 7 of 10 ( Start time: 07:55:51 AM ) Total Marks: 1
In the analysis of Selection algorithm, we eliminate a constant fraction of the array with each phase; we get the convergent _______________ series in the analysis,
Select correct option:
□ linear
□ arithmetic
□ **geometric**
□ exponent

Question # 8 of 10 ( Start time: 07:56:30 AM ) Total Marks: 1
One of the clever aspects of heaps is that they can be stored in arrays without using any _______________.
Select correct option:
□ **pointers**
□ constants
□ variables
□ functions

Question # 9 of 10 ( Start time: 07:56:41 AM ) Total Marks: 1
Analysis of Selection algorithm ends up with,
Select correct option:
□ **T(n)**
□ T(1 / 1 + n)
□ T(n / 2)
□ T((n / 2) + n)

Question # 10 of 10 ( Start time: 07:58:12 AM ) Total Marks: 1
The analysis of Selection algorithm shows the total running time is indeed ________in n,
Select correct option:
□ arithmetic
□ geometric
□ **linear**
□ orthogonal
============================================================>

**MCQz (Set-12)**

**Question No: 1 ( Marks: 1 ) - Please choose one**
An optimization problem is one in which you want to find,
► Not a solution

► An algorithm
► Good solution
**► The best solution**

# Below Highlighted is Not For Midterm

**Question No: 2 ( Marks: 1 ) - Please choose one**
Although it requires more complicated data structures, Prim's algorithm for a minimum spanning tree is better than Kruskal's when the graph has a large number of vertices.
► True
► False

**Question No: 3 ( Marks: 1 ) - Please choose one**
If a problem is in NP, it must also be in P.
► True
► False
► unknown

**Question No: 4 ( Marks: 1 ) - Please choose one**
What is generally true of Adjacency List and Adjacency Matrix representations of graphs?
► *Lists* require less space than *matrices* but take longer to find the weight of an edge (v1,v2)
► *Lists* require less space than *matrices* and they are faster to find the weight of an edge (v1,v2)
► *Lists* require more space than *matrices* and they take longer to find the weight of an edge (v1,v2)
► *Lists* require more space than *matrices* but are faster to find the weight of an edge (v1,v2)

**Question No: 5 ( Marks: 1 ) - Please choose one**
If a graph has v vertices and e edges then to obtain a spanning tree we have to delete
► v edges.
► v – e + 5 edges
► v + e edges.
► None of these

**Question No: 6 ( Marks: 1 ) - Please choose one**
Maximum number of vertices in a Directed Graph may be |V2|
► True
► False

**Question No: 7 ( Marks: 1 ) - Please choose one**
The Huffman algorithm finds a (n) _____________ solution.
► Optimal
► Non-optimal
► Exponential
► Polynomial

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

The Huffman algorithm finds an exponential solution
► True
► False
**Question No: 9 ( Marks: 1 ) - Please choose one**
The Huffman algorithm finds a polynomial solution
► True
► False
**Question No: 10 ( Marks: 1 ) - Please choose one**
The greedy part of the Huffman encoding algorithm is to first find two nodes with **larger** frequency.
► True
► False
**Question No: 11 ( Marks: 1 ) - Please choose one**
The codeword assigned to characters by the Huffman algorithm have the property that no codeword is the postfix of any other.
► True
► False
**Question No: 12 ( Marks: 1 ) - Please choose one**
Huffman algorithm uses a greedy approach to generate a postfix code T that minimizes the expected length B (T) of the encoded string.
► True
► False
**Question No: 13 ( Marks: 1 ) - Please choose one**
Shortest path problems can be solved efficiently by modeling the road map as a graph.
► True
► False
**Question No: 14 ( Marks: 1 ) - Please choose one**
Dijkestra's single source shortest path algorithm works if all edges weights are non-negative and there are negative cost cycles.
► True
► False

**Question No: 15 ( Marks: 1 ) - Please choose one**
Bellman-Ford allows negative weights edges and negative cost cycles.
► True
► False
**Question No: 16 ( Marks: 1 ) - Please choose one**
The term "coloring" came form the original application which was in architectural design.
► True
► False
**Question No: 17 ( Marks: 1 ) - Please choose one**
In the clique cover problem, for two vertices to be in the same group, they must be adjacent to each other.
► True
► False

**Question No: 18 ( Marks: 1 ) - Please choose one**
Dijkstra's algorithm is operates by maintaining a subset of vertices
► True
► False
**Question No: 19 ( Marks: 1 ) - Please choose one**
The difference between Prim's algorithm and Dijkstra's algorithm is that Dijkstra's algorithm uses a different key.
► True
► False
**Question No: 20 ( Marks: 1 ) - Please choose one**
Consider the following adjacency list:

Which of the following graph(s) describe(s) the above adjacency list?
►
►
►

►
**Question No: 21 ( Marks: 1 ) - Please choose one**
We do sorting to,
► keep elements in random positions
► keep the algorithm run in linear order
► keep the algorithm run in (log n) order
► keep elements in increasing or decreasing order
**Question No: 22 ( Marks: 1 ) - Please choose one**
After partitioning array in Quick sort, pivot is placed in a position such that
► Values smaller than pivot are on left and larger than pivot are on right
► Values larger than pivot are on left and smaller than pivot are on right
► Pivot is the first element of array
► Pivot is the last element of array
**Question No: 23 ( Marks: 1 ) - Please choose one**
Merge sort is stable sort, but not an in-place algorithm

► True
► False
**Question No: 24 ( Marks: 1 ) - Please choose one**
In counting sort, once we know the ranks, we simply _________ numbers to their final positions in an output array.
► Delete
► copy
► Mark
► arrange

**Question No: 25 ( Marks: 1 ) - Please choose one**
Dynamic programming algorithms need to store the results of intermediate sub-problems.

► True
► False

**Question No: 26 ( Marks: 1 ) - Please choose one**

A p × q matrix A can be multiplied with a q × r matrix B. The result will be a p × r matrix C. There are (p . r) total entries in C and each takes _________ to compute.

► O (q)
► O (1)
► O (n2)
► O (n3)

=================================================================>

**MCQz (Set-13)**

Question # 1 of 10 ( Start time: 10:02:41 PM ) Total Marks: 1
For the sieve technique we solve the problem,
Select correct option:
**recursively**
mathematically
precisely
accurately

The sieve technique works in ___________ as follows
Select correct option:
**phases**
numbers
integers
routines

Slow sorting algorithms run in,
Select correct option:
**T(n^2)**
T(n)
T( log n)

A (an) _________ is a left-complete binary tree that conforms to the heap order
Select correct option:
**heap**
binary tree
binary search tree
array

In the analysis of Selection algorithm, we eliminate a constant fraction of the array with each phase; we get the convergent _______________ series in the analysis,
Select correct option:
linear
arithmetic
**geometric**
exponent

In the analysis of Selection algorithm, we make a number of passes, in fact it could be as many as,
Select correct option:
T(n)
**T(n / 2)**
log n
n / 2 + n / 4
The sieve technique is a special case, where the number of sub problems is just
Select correct option:
5
many
**1**
few
In which order we can sort?
Select correct option:
increasing order only
decreasing order only
**increasing order or decreasing order**
both at the same time
The recurrence relation of Tower of Hanoi is given below T(n)={1 if n=1 and 2T(n-1) if n >1 In order to move a tower of 5 rings from one peg to another, how many ring moves are required?
Select correct option:
16
10
**32**
31
Analysis of Selection algorithm ends up with,
Select correct option:
T(n)
T(1 / 1 + n)
T(n / 2)
**T((n / 2) + n)**
Last message received on 10/13 at 12:43 AM

Khanjee: We do sorting to,
Select correct option:
keep elements in random positions
keep the algorithm run in linear order
keep the algorithm run in (log n) order
**keep elements in increasing or decreasing order**
Khanjee: Divide-and-conquer as breaking the problem into a small number of
Select correct option:
pivot
Sieve
**smaller sub problems**
Selection

The analysis of Selection algorithm shows the total running time is indeed ________in n,
Select correct option:
arithmetic
geometric
**linear**
orthogonal
How many elements do we eliminate in each time for the Analysis of Selection algorithm?
Select correct option:
**n / 2 elements**
(n / 2) + n elements
n / 4 elements
2 n elements

Sieve Technique can be applied to selection problem?
Select correct option:
**True**
For the heap sort we store the tree nodes in
Select correct option:
**level-order traversal**
in-order traversal
pre-order traversal
post-order traversal

=============================================================>

**MCQz (Set-14)**

Question # 1 of 10 ( Start time: 10:49:41 PM ) Total Marks: 1
Which is true statement in the following.
Select correct option:
Kruskal algorithm is multiple source technique for finding MST.
Kruskal's algorithm is used to find minimum spanning tree of a graph, time complexity of this algorithm is O(EV)
Both of above
**Kruskal's algorithm (choose best non-cycle edge) is better than Prim's (choose best Tree edge) when the graph has relatively few edges.**

Question # 2 of 10 ( Start time: 10:50:58 PM ) Total Marks: 1
Which is true statement.
Select correct option:
**Breadth first search is shortest path algorithm that works on un-weighted graphs**
Depth first search is shortest path algorithm that works on un-weighted graphs.
Both of above are true.
None of above are true.

Question # 3 of 10 ( Start time: 10:52:18 PM ) Total Marks: 1

What is the time complexity to extract a vertex from the priority queue in Prim's algorithm?
Select correct option:

**log (V)**
V.V
E.E
log (E)

Question # 4 of 10 ( Start time: 10:53:03 PM ) Total Marks: 1
The relationship between number of back edges and number of cycles in DFS is,
Select correct option:

Both are equal
Back edges are half of cycles
Back edges are one quarter of cycles
There is no relationship between no. of edges and cycles

Question # 5 of 10 ( Start time: 10:54:28 PM ) Total Marks: 1
Kruskal's algorithm (choose best non-cycle edge) is better than Prim's (choose best tree edge) when the graph has relatively few edges.
Select correct option:

True
False

Question # 6 of 10 ( Start time: 10:55:28 PM ) Total Marks: 1
In digraph G=(V,E) ;G has cycle if and only if
Select correct option:

The DFS forest has forward edge.
The DFS forest has back edge
The DFS forest has both back and forward edge
BFS forest has forward edge

Question # 7 of 10 ( Start time: 10:57:01 PM ) Total Marks: 1
There is relationship between number of back edges and number of cycles in DFS
Select correct option:

Both are equal.
Cycles are half of back edges.
Cycles are one fourth of back edges.
There is no relationship between back edges and number of cycles.

Question # 8 of 10 ( Start time: 10:57:27 PM ) Total Marks: 1
A digraph is strongly connected under what condition?
Select correct option:

A digraph is strongly connected if for every pair of vertices u, v e V, u can reach v .
A digraph is strongly connected if for every pair of vertices u, v e V, u can reach v and vice versa.
A digraph is strongly connected if for at least one pair of vertex u, v e V, u can reach v and vice versa.

A digraph is strongly connected if at least one third pair of vertices u, v e V, u can reach v and vice versa.

Question # 9 of 10 ( Start time: 10:58:50 PM ) Total Marks: 1
If you find yourself in maze the better traversel approach will be :
Select correct option:

**BFS**
BFS and DFS both are valid
Level order
DFS

Question # 10 of 10 ( Start time: 11:00:12 PM ) Total Marks: 1
You have an adjacency list for G, what is the time complexity to compute Graph transpose G^T ?
Select correct option:

(V+E)
V.E
V
E

============================================================>

**MCQz (Set-15)**

Question # 1 of 10 ( Start time: 11:07:45 PM ) Total Marks: 1
You have an adjacency list for G, what is the time complexity to compute Graph transpose G^T ?
Select correct option:

**(V+E)**
V.E
V
E

Question # 2 of 10 ( Start time: 11:08:28 PM ) Total Marks: 1
Kruskal's algorithm (choose best non-cycle edge) is better than Prim's (choose best tree edge) when the graph has relatively few edges.
Select correct option:

**True**
False

Question # 3 of 10 ( Start time: 11:09:01 PM ) Total Marks: 1
The relationship between number of back edges and number of cycles in DFS is,
Select correct option:

**Both are equal**
Back edges are half of cycles
Back edges are one quarter of cycles
There is no relationship between no. of edges and cycles

Question # 4 of 10 ( Start time: 11:09:41 PM ) Total Marks: 1
What is the time complexity to extract a vertex from the priority queue in Prim's algorithm?
Select correct option:
**log (V)**
V.V
E.E
log (E)

Question # 5 of 10 ( Start time: 11:10:14 PM ) Total Marks: 1
Which is true statement in the following.
Select correct option:
Kruskal algorithm is multiple source technique for finding MST.
Kruskal's algorithm is used to find minimum spanning tree of a graph, time complexity of this algorithm is O(EV)
Both of above
**Kruskal's algorithm (choose best non-cycle edge) is better than Prim's (choose best Tree edge) when the graph has relatively few edges.**

============================================================>

**MCQz (Set-16)**

Question # 1 of 10 ( Start time: 06:18:58 PM ) Total Marks: 1
We do sorting to,
Select correct option:
keep elements in random positions
keep the algorithm run in linear order
keep the algorithm run in (log n) order
**keep elements in increasing or decreasing order**

Question # 2 of 10 ( Start time: 06:19:38 PM ) Total Marks: 1
Heaps can be stored in arrays without using any pointers; this is due to the ____________ nature of the binary tree,
Select correct option:
**left-complete**
right-complete
tree nodes
tree leaves

Question # 3 of 10 ( Start time: 06:20:18 PM ) Total Marks: 1
Sieve Technique can be applied to selection problem?
Select correct option:
**True**
False

Question # 4 of 10 ( Start time: 06:21:10 PM ) Total Marks: 1
A heap is a left-complete binary tree that conforms to the ___________
Select correct option:
increasing order only
decreasing order only
**heap order**
(log n) order

Question # 5 of 10 ( Start time: 06:21:39 PM ) Total Marks: 1
A (an) _________ is a left-complete binary tree that conforms to the heap order
Select correct option:
**heap**
binary tree
binary search tree
array
Question # 6 of 10 ( Start time: 06:22:04 PM ) Total Marks: 1
Divide-and-conquer as breaking the problem into a small number of
Select correct option:
pivot
Sieve
**smaller sub problems**
Selection
Question # 7 of 10 ( Start time: 06:22:40 PM ) Total Marks: 1
In Sieve Technique we do not know which item is of interest
Select correct option:
**True**
False
Question # 8 of 10 ( Start time: 06:23:26 PM ) Total Marks: 1
The recurrence relation of Tower of Hanoi is given below T(n)={1 if n=1 and 2T(n-1) if n >1 In order to move a tower of 5 rings from one peg to another, how many ring moves are required?
Select correct option:
16
10
**32**
31
Question # 9 of 10 ( Start time: 06:24:44 PM ) Total Marks: 1
In the analysis of Selection algorithm, we eliminate a constant fraction of the array with each phase; we get the convergent _______________ series in the analysis,
Select correct option:
linear
arithmetic
**geometric**
exponent
Question # 10 of 10 ( Start time: 06:25:43 PM ) Total Marks: 1
For the heap sort, access to nodes involves simple _______________ operations.
Select correct option:
**arithmetic**
binary
algebraic
logarithmic
==========================================================>

## MCQz (Set-17)

For the sieve technique we solve the problem,
Select correct option:
**recursively**

mathematically
precisely
accurately
The sieve technique works in ___________ as follows
Select correct option:
**Phases**
numbers
integers
routines
Slow sorting algorithms run in,
Select correct option:
**T(n^2)**
T(n)
T( log n)
A (an) _________ is a left-complete binary tree that conforms to the heap order
Select correct option:
**heap**
binary tree
binary search tree
array
In the analysis of Selection algorithm, we eliminate a constant fraction of the array with each phase; we get the convergent _______________ series in the analysis,
Select correct option:
linear
arithmetic
geometric
**exponent**
In the analysis of Selection algorithm, we make a number of passes, in fact it could be as many as,
Select correct option:
T(n)
**T(n / 2)**
log n
n / 2 + n / 4
The sieve technique is a special case, where the number of sub problems is just
Select correct option:
5
many
**1**
Few
In which order we can sort?
Select correct option:
increasing order only
decreasing order only
**increasing order or decreasing order**
both at the same time
The recurrence relation of Tower of Hanoi is given below T(n)={1 if n=1 and 2T(n-1) if n >1 In order to move a tower of 5 rings from one peg to another, how many ring moves are required?

Select correct option:
16
10
**32**
31
Analysis of Selection algorithm ends up with,
Select correct option:
T(n)
T(1 / 1 + n)
T(n / 2)
We do sorting to,
Select correct option:
keep elements in random positions
keep the algorithm run in linear order
keep the algorithm run in (log n) order
**keep elements in increasing or decreasing order**
Divide-and-conquer as breaking the problem into a small number of
Select correct option:
pivot
Sieve
**smaller sub problems**
Selection
The analysis of Selection algorithm shows the total running time is indeed ________in n,
Select correct option:
arithmetic
geometric
**linear**
orthogonal
How many elements do we eliminate in each time for the Analysis of Selection algorithm?
Select correct option:
**n / 2 elements**
(n / 2) + n elements
n / 4 elements
2 n elements
Sieve Technique can be applied to selection problem?
Select correct option:
**True**
False
For the heap sort we store the tree nodes in
Select correct option:
**level-order traversal**
in-order traversal
pre-order traversal
post-order traversal

==============================================================>

## MCQz (Set-18)

**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

► □ notation
► □ 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?

► $n^2$
► 2
$n$
$n$
► $n$
►
$n^8$

**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

===========================================================>

**MCQz (Set-19)**

Question # 1 of 10 Total Marks: 1
Divide-and-Conquer is as breaking the problem into a small number of
**· Smaller Sub Problems**
· Pivot
· Sieve
· Solutions

Question # 2 of 10 Total Marks: 1
Analysis of Selection Sort ends up with
**· T(n)**
· T(1/1+n)
· T(n/2)
· T((n/2) +n)

Question # 3 of 10 Total Marks: 1
How many elements do we eliminate each time for the Analysis of Selection Algorithm?
· (n / 2)+n Elements
**· n / 2 Elements**
· n / 4 Elements

· 2 n Elements
Question # 4 of 10 Total Marks: 1
A *heap* is a left-complete binary tree that conforms to the ?
· Increasing Order
· Decreasing order
**· Heap Order**
· (nlog n) order
Question # 5 of 10 Total Marks: 1
The Sieve Sequence is a special case where the number of smaller sub problems is just_ .
· 4
· Many
**· 1**
· Few

Question # 6 of 10 Total Marks: 1
Heaps can be stored in arrays without using any pointers this is due to the of the binary tree?
· Tree Nodes
· Right-Complete Nature
**· Left-Complete Nature**
· Tree Leaves
Question # 7 of 10 Total Marks: 1
For the Heap Sort access to nodes involves simple _ operations:
· Geometric
· Linear
**· Arithmetic**
· Algebraic
Question # 8 of 10 Total Marks: 1
The Analysis of Selection Sort shows that the total running time is indeed in n?
· Geometric
**· Linear**
· Arithmetic
· Algebraic
Question # 9 of 10 Total Marks: 1
For the sieve technique we solve the problem
**· Recursively**
· Randomly
· Mathematically
· Precisely
Question # 10 of 10 Total Marks: 1
How much time merger sort takes for an array of numbers?
· T(n^2)
· T(n)
· T(log n)
**· T(n log n)**

**MCQz (Set-20)**

Question # 1 of 10 ( Start time: 06:18:58 PM ) Total Marks: 1
We do sorting to,
Select correct option:
keep elements in random positions
keep the algorithm run in linear order
keep the algorithm run in (log n) order
**keep elements in increasing or decreasing order**
Question # 2 of 10 ( Start time: 06:19:38 PM ) Total Marks: 1
Heaps can be stored in arrays without using any pointers; this is due to the ____________ nature of the binary tree,
Select correct option:
**left-complete**
right-complete
tree nodes
tree leaves
Question # 3 of 10 ( Start time: 06:20:18 PM ) Total Marks: 1
Sieve Technique can be applied to selection problem?
Select correct option:
**True**
False
Question # 4 of 10 ( Start time: 06:21:10 PM ) Total Marks: 1
A heap is a left-complete binary tree that conforms to the

___________
Select correct option:
increasing order only
decreasing order only
**heap order**
(log n) order
Question # 5 of 10 ( Start time: 06:21:39 PM ) Total Marks: 1
A (an) _________ is a left-complete binary tree that conforms to the heap order
Select correct option:
**heap**
binary tree
binary search tree
array
Question # 6 of 10 ( Start time: 06:22:04 PM ) Total Marks: 1
Divide-and-conquer as breaking the problem into a small number of
Select correct option:
pivot
Sieve
**smaller sub problems**
Selection
Question # 7 of 10 ( Start time: 06:22:40 PM ) Total Marks: 1
In Sieve Technique we do not know which item is of interest
Select correct option:
**True**

False
Question # 8 of 10 ( Start time: 06:23:26 PM ) Total Marks: 1
The recurrence relation of Tower of Hanoi is given below T(n)={1 if n=1 and 2T(n-1) if n >1 In order to move a tower of 5 rings from one peg to another, how many ring moves are required?
Select correct option:
16
10
**32**
31
Question # 9 of 10 ( Start time: 06:24:44 PM ) Total Marks: 1
In the analysis of Selection algorithm, we eliminate a constant fraction of the array with each phase; we get the convergent _______________ series in the analysis,
Select correct option:
linear
arithmetic
**geometric**
exponent
Question # 10 of 10 ( Start time: 06:25:43 PM ) Total Marks: 1
For the heap sort, access to nodes involves simple _______________ operations.
Select correct option:
**arithmetic**
binary
algebraic
**logarithmic**
Question # 1 of 10 ( Start time: 10:02:41 PM ) Total Marks: 1
For the sieve technique we solve the problem,
Select correct option:
**recursively**
mathematically
precisely
accurately
The sieve technique works in ___________ as follows
Select correct option:
**phases**
numbers
integers
routines
Slow sorting algorithms run in,
Select correct option:
**T(n^2)**
T(n)
T( log n)
A (an) _________ is a left-complete binary tree that conforms to the heap order
Select correct option:
**heap**
binary tree

binary search tree
array
In the analysis of Selection algorithm, we eliminate a constant fraction of the array with each phase; we get the convergent _______________ series in the analysis,
Select correct option:
linear
arithmetic
**geometric**
exponent
In the analysis of Selection algorithm, we make a number of passes, in fact it could be as many as,
Select correct option:
T(n)
**T(n / 2)**
log n
n / 2 + n / 4
The sieve technique is a special case, where the number of sub problems is just
Select correct option:
5
many
**1**
few
In which order we can sort?
Select correct option:
increasing order only
decreasing order only
**increasing order or decreasing order**
both at the same time
The recurrence relation of Tower of Hanoi is given below T(n)={1 if n=1 and 2T(n-1) if n >1 In
order to move a tower of 5 rings from one peg to another, how many ring moves are required?
Select correct option:
16
10
**32**
31
Analysis of Selection algorithm ends up with,
Select correct option:
T(n)
T(1 / 1 + n)
T(n / 2)
**T((n / 2) + n)**
Last message received on 10/13 at 12:43 AM
Khanjee: We do sorting to,
Select correct option:
keep elements in random positions
keep the algorithm run in linear order
keep the algorithm run in (log n) order

**keep elements in increasing or decreasing order**
Khanjee: Divide-and-conquer as breaking the problem into a small number of
Select correct option:
pivot
Sieve
**smaller sub problems**
Selection
The analysis of Selection algorithm shows the total running time is indeed ________in n,
Select correct option:
arithmetic
geometric
**linear**
orthogonal
How many elements do we eliminate in each time for the Analysis of Selection algorithm?
Select correct option:
**n / 2 elements**
(n / 2) + n elements
n / 4 elements
2 n elements
Sieve Technique can be applied to selection problem?
Select correct option:
**True**
For the heap sort we store the tree nodes in
Select correct option:
**level-order traversal**
in-order traversal
pre-order traversal
post-order traversal
==========================================================>

**MCQz (Set-21)**

1-One of the clever aspects of heaps is that they can be stored in arrays without using any _______________.
**pointers ****
constants
variables
functions
**2- For the heap sort we store the tree nodes in**
**level-order traversal****
in-order traversal
pre-order traversal
post-order traversal
**3- The sieve technique works in ___________ as follows**
**phases**
numbers
integers
routines
**4- In the analysis of Selection algorithm, we eliminate a constant fraction of the array with each phase; we get the convergent _______________ series in the analysis,**

linear
arithmetic
**geometric ****
exponent
**5- We do sorting to,**
keep elements in random positions
keep the algorithm run in linear order
keep the algorithm run in (log n) order
**keep elements in increasing or decreasing order *****
**6- In the analysis of Selection algorithm, we make a number of passes, in fact it could be as**
**many as,**
T(n)
**T(n / 2)*****
log n
n / 2 + n / 4
**7- In which order we can sort?**
increasing order only
decreasing order only
**increasing order or decreasing order *****
both at the same time
**8- In Sieve Technique we do not know which item is of interest**
**True****
False
**9- For the sieve technique we solve the problem,**
**recursively****
mathematically
precisely
**10- Divide-and-conquer as breaking the problem into a small number of**
pivot
Sieve
**smaller sub problems ****
Selection
============================================================>

**MCQz (Set-22)**

Question # 1 of 10 Total Marks: 1
Divide-and-Conquer is as breaking the problem into a small number of
**· Smaller Sub Problems**
· Pivot
· Sieve
· Solutions
Question # 2 of 10 Total Marks: 1
Analysis of Selection Sort ends up with
**· T(n)**
· T(1/1+n)
· T(n/2)
· T((n/2) +n)
Question # 3 of 10 Total Marks: 1

How many elements do we eliminate each time for the Analysis of Selection Algorithm?
· (n / 2)+n Elements
**· n / 2 Elements**
· n / 4 Elements
· 2 n Elements
Question # 4 of 10 Total Marks: 1
A *heap* is a left-complete binary tree that conforms to the ?
· Increasing Order
· Decreasing order
**· Heap Order**
· (nlog n) order
Question # 5 of 10 Total Marks: 1
The Sieve Sequence is a special case where the number of smaller sub problems is
just_ .
· 4
· Many
**· 1**
· Few

Question # 6 of 10 Total Marks: 1
Heaps can be stored in arrays without using any pointers this is due to the of the binary tree?
· Tree Nodes
· Right-Complete Nature
**· Left-Complete Nature**
· Tree Leaves
Question # 7 of 10 Total Marks: 1
For the Heap Sort access to nodes involves simple _ operations:
· Geometric
· Linear
**· Arithmetic**
· Algebraic
Question # 8 of 10 Total Marks: 1
The Analysis of Selection Sort shows that the total running time is indeed in n?
· Geometric
**· Linear**
· Arithmetic
· Algebraic
Question # 9 of 10 Total Marks: 1
For the sieve technique we solve the problem
**· Recursively**
· Randomly
· Mathematically
· Precisely
Question # 10 of 10 Total Marks: 1
How much time merger sort takes for an array of numbers?
· T(n^2)

· T(n)
· T(log n)
· **T(n log n)**

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**MCQz (Set-23)**

Question # 2 of 10 ( Start time: 09:23:34 PM ) Total Marks: 1
**The analysis of Selection algorithm shows the total running time is indeed ________in n,**
Select correct option:

arithmetic
**geometric**
linear
orthogonal

Question # 3 of 10 ( Start time: 09:24:49 PM ) Total Marks: 1
**In the analysis of Selection algorithm, we eliminate a constant fraction of the array with each phase; we get the convergent _______________ series in the analysis,**
Select correct option:

linear
arithmetic
**geometric**
exponent

Question # 4 of 10 ( Start time: 09:25:08 PM ) Total Marks: 1
**Slow sorting algorithms run in,**
Select correct option:

**T(n^2) page 39**
T(n)
T( log n)
T(n log n)

Question # 5 of 10 ( Start time: 09:26:31 PM ) Total Marks: 1
**Heaps can be stored in arrays without using any pointers; this is due to the ____________ nature of the binary tree,**
Select correct option:

**left-complete**
right-complete
tree nodes
tree leaves

Question # 6 of 10 ( Start time: 09:27:11 PM ) Total Marks: 1

**A heap is a left-complete binary tree that conforms to the ___________**
Select correct option:

increasing order only
decreasing order only
**heap order**
(log n) order

Question # 7 of 10 ( Start time: 09:27:25 PM ) Total Marks: 1
**Divide-and-conquer as breaking the problem into a small number of**
Select correct option:

pivot
Sieve
**smaller sub problems**
Selection

Question # 8 of 10 ( Start time: 09:27:45 PM ) Total Marks: 1
**The number of nodes in a complete binary tree of height h is**
Select correct option:

**2^(h+1) – 1**
2 * (h+1) – 1
2 * (h+1)
((h+1) ^ 2) – 1

Question # 9 of 10 ( Start time: 09:28:01 PM ) Total Marks: 1
**The sieve technique works in ___________ as follows**
Select correct option:

**phases**
numbers
integers
routines

Question # 10 of 10 ( Start time: 09:28:24 PM ) Total Marks: 1
**The running time of quick sort depends heavily on the selection of**
Select correct option:

No of inputs
Arrangement of elements in array
Size o elements
**Pivot element**

Question # 1 of 10 ( Start time: 09:22:00 PM ) Total Marks: 1
**In Quick sort algorithm,constants hidden in T(n lg n) are**
Select correct option:

Large
Medium
**Not known (not confirmed)**
small

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**MCQz (Set-24)**

Question # 1
**Sorting is one of the few problems where provable ________ bonds exits on how fast we can sort,**
Select correct option:
upper
**lower page 39**
average
log n

Question # 2
**For the heap sort we store the tree nodes in**
Select correct option:
**level-order traversal**
in-order traversal
pre-order traversal
post-order traversal

Question # 3
**Quick sort is based on divide and conquer paradigm; we divide the problem on base of pivot element and:**
Select correct option:
**There is explicit combine process as well to conquer the solutin.**
No work is needed to combine the sub-arrays, the array is already sorted
Merging the subarrays
None of above.

Question # 4
**In Sieve Technique we do not know which item is of interest**
Select correct option:
**True**
False

Question # 5
**One of the clever aspects of heaps is that they can be stored in arrays without using any _______________.**
Select correct option:
**pointers**
constants
variables

functions

Question # 6
**The sieve technique is a special case, where the number of sub problems is just**
Select correct option:
5
many
**1**
few

Question # 7
**The number of nodes in a complete binary tree of height h is**
Select correct option:
**2^(h+1) – 1**
2 * (h+1) – 1
2 * (h+1)
((h+1) ^ 2) – 1

Question # 8
**A heap is a left-complete binary tree that conforms to the ___________**
Select correct option:
increasing order only
decreasing order only
**heap order**
(log n) order

Question # 9
**In which order we can sort?**
Select correct option:
increasing order only
decreasing order only
**increasing order or decreasing order**
both at the same time

Question # 10
**The sieve technique works in ___________ as follows**
Select correct option:
**phases**
numbers
integers
routines

**MCQz (Set-26) From 2004 Paper**

**Q#1**Total time for heapify is:
O ($\log^2 n$)
O (n log n)
O ($n^2 \log n$)

O (log n)

**Q#2**

Solve the recurrence using iteration method and also find time complexity (Θ notation) T (n) = C + O (1) + T (n-1) T (1) =1 and C is a constant.

**Q#3**

Suggest the criteria for measuring algorithms. Also discuss the issues need to be discussed in the algorithm design.

**Q#4**

If an algorithm has a complexity of $\log_2 n + n\log_2 n + n$. we could say that it has complexity

O(n)

O( n $\log_2$ n)

O(3)

O( $\log_2$ ( $\log_2$ n ))

O ( $\log_2$ n)

**Q#5**

Let the set P = {(1, 13), (2, 9), (3, 15), (4, 12), (5, 14), (6, 6), (7, 3), (8, 10), (9, 2), (10, 8), (11, 9), (13, 6), (15, 3), (18, 5)}. You are required to give the final state of stack after the execution of sweep line algorithm for 2d-maxima. No intermediate steps or graphics to be shown.

**Q#6**

Suppose we have hardware capable of executing $10^6$ instructions per second. How long would it take to execute an algorithm whose complexity function is T (n) = $2n^2$ on an input of size n = $10^8$?

**Q#7**

In RAM model instructions are executed

One after another

Parallel

Concurrent

Random

**Q#8**

In selection algorithm, because we eliminate a constant fraction of the array with each phase, we get the

Convergent geometric series

Divergent geometric series

None of these

**Q#9**

Due to left-complete nature of binary tree, heaps can be stored in

Link list

Structure

Array

None of above

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**MCQz (Set-27) From 2004 Paper**

Consider the following pairs of functions
I . $f(x) = x^2 + 3x+7$ $g(x) = x^2 + 10$
II $f(x) = x^2\log(x)$ $g(x) = x^3$
III $f(x) = x^4 + \log(3x^8 +7)$ $g(x) = (x^2 +17x +3)^2$
Which of the pairs of functions f and g are asymptotic?
 Only I
 Only II
 Both I and III
 None of the above
**Question No. 3 Marks : 1**
Execution of the following code fragment

```
int Idx;
for (Idx = 0; Idx < N; Idx++)
{
cout << A[Idx] << endl;
}
```

is best described as being
 O(N)
 $O(N^2)$
 O(log N)
 O(N log N)
**Question No. 4 Marks : 1**
If algorithm *A* has running time $7n^2 + 2n + 3$ and algorithm *B* has running time $2n^2$, then
 Both have same asymptotic time complexity
 A is asymptotically greater
 B is asymptotically greater
 None of others
**Question No. 5 Marks : 1**
Which of the following sorting algorithms is stable?
(i) Merge sort,
(ii) Quick sort,
(iii) Heap sort,
(iv) Counting Sort.
 Only i
 Only ii
 Both i and ii
 Both iii and iv
**Question No. 6 Marks : 5**
Determine the complexity of an algorithm that measures the number of print statements in an
algorithm that takes a positive integer *n* and prints 1 one time, 2 two times, 3 three times , … ,
n n times.
That is
1
2 2
3 3 3

……………
……………
n n n n ……..n (n times)

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**MCQz (Set-28) From 2007 Paper**

**Q#1**Total time for heapify is:
O (log2 n)
O (n log n)
O (n2 log n)
O (log n)
**Q#2**
Solve the recurrence using iteration method and also find time complexity (Θ notation)
T (n) = C + O (1) + T (n-1)
T (1) =1 and C is a constant.
**Q#3**
Suggest the criteria for measuring algorithms. Also discuss the issues need to be discussed in the algorithm design.
**Q#4**
If an algorithm has a complexity of **log 2 *n* + nlog 2 *n* + n**. we could say that it has complexity
O(n)
O( n log2 n)
O(3)
O( log2 ( log2 n ))
O ( log2 n)
**Q#5**
Let the set P = {(1, 13), (2, 9), (3, 15), (4, 12), (5, 14), (6, 6), (7, 3), (8, 10), (9, 2), (10, 8), (11, 9), (13, 6), (15, 3), (18, 5)}. You are required to give the final state of stack after the execution of sweep line algorithm for 2d-maxima. No intermediate steps or graphics to be shown.
**Q#6**
Suppose we have hardware capable of executing 106 instructions per second. How long would it take to execute an algorithm whose complexity function is T (n) = 2n2 on an input of size n = 108?
**Q#7**
In RAM model instructions are executed
One after another
Parallel
Concurrent
Random
**Q#8**
In selection algorithm, because we eliminate a constant fraction of the array with each phase, we get the
Convergent geometric series
Divergent geometric series
None of these
**Q#9**

Due to left-complete nature of binary tree, heaps can be stored in
Link list
Structure
Array
None of above

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