

CHANDIGARH UNIVERSITY

Gharuan, Mohali

Institute/Department: UNIVERSITY INSTITUTE OF ENGINEERING

Division: BLOCK 1

Subject Name: DATA STRUCTURES

Subject Code: CST-231

Assignment No.: 1

Max. Marks: 12

Date of Allotment: 17 AUG 2019

Last date of Submission: 20 SEPTEMBER 2019

Course Outcomes:

CO Number	Title	Level
CO1	To be able to compare different sorting techniques and compute their complexities	Remember
CO2	To perform particular sorting algorithm and calculate passes required for given size of array	Understand
CO3	To understand arrays storage in the memory and the allocation for the elements in the array	Understand
CO4	To write pseudocode for any algorithm and find min max of the given elements	Understand
CO5	To find various operations on arrays and search the elements within it.	Understand
CO6	To understand types of complexities and notation in data structures for different types of algorithms	Understand

ASSIGNMENT SET 1

Questions:

Sr. No.	Question	CO Number
1	Declare and initialize the array named data with the following values: 34 56 4 10 77 51 93 30 5 52 After how many passes entire values	CO3

	will be sorted using Insertion sort.	
2	Arrange the following data items 32,51,27,85,66,23,13,57 in ascending order using bubble sort . Find out no of passes and time complexity for worst case.	CO2
3	Which one of these is the higher complexity and why? $O(n^2)$ and $O(n)$.Justify with example.	CO6
4	Calculate address of 47 th element of array where base address is 108, where words per memory cell is 4 and array is Declared as A[1000].	CO4
5	Write an algorithm to delete an element from an array from location K. Give step wise explanation in detail along with array representation in memory with example.	CO5

ASSIGNMENT SET 2

Questions:

Sr. No.	Question	CO Number
1	Arrange the following data items 32,51,27,85,66,23,13, 57 in ascending order using Selection sort . Find out no of passes and time complexity for all cases.	CO5
2	Suppose following numbers are sorted in an array A: 32,51,26,84,63,21,11,54 Using Binary search find the location of item 26,11 and 99.	CO2
3	Suppose multidimensional arrays A and B are declared using A(-2:2,2:2) and B(1:8,-7:7,-10:5) Find length of each dimension and number of elements in A and B.	CO3
4	Consider the element B[3,3,3] in B. Find effective indices E1,E2,E3 and address of element assuming Base(B)=500 and w=3 per memory location	CO5
5	What are Asymptotic Notations? How complexity be measured for an algorithm? Justify with suitable example for all cases.	CO6
6	Consider an array A: double A[55]; How many bytes will it take in memory?	CO5

7	<p>Consider the code:</p> <pre>for(i=0;i<n;i++) { Cout<<"Hi"; }</pre> <p>What will be the Big O complexity of this code.</p>	CO4
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ASSIGNMENT SET 3

Sr. No.	Question	CO Number
1	Sorting is not possible by using which of the following methods? (Insertion, Selection, Exchange, Deletion). Justify	CO2
2	Find out number of comparison required to determine location of an item if array consist of 100000 data elements.	CO1
3	Write a Sub Algorithm to find the smallest element from the given array. Illustrate using an example.	CO3
4	Suppose Base (AAA) = 300 and w=4 words per memory cell for AAA Array. Find address of AAA[45], AAA[35] and AAA[65] and array is Declared as AAA[899].	CO4
5	<p>44 68 191 119 119 37 83 82 191 45 158 130 76 153 39 25</p> <p>What is the T(N), actual number of statements executed, of the selection sort code, given a list of N elements above? What is the Big O?</p>	CO5

ASSIGNMENT SET 4

Sr. No.	Question	CO Number
1	Write an algorithm to Insert an element from an array from location K. Give explanation in detail.	CO1
2	<p>Let A be a two-dimensional array declared as follows:</p> <p>A: array[1..23][1..19] of integer;</p> <p>Assuming that each integer takes one memory location, the array is stored in row-major order and the first element of the array is stored at the location. Find out the address of the address of the element A[i][j].</p>	CO2
3	Write an algorithm for Binary search and explain with example. Also discuss the complexity of an algorithm.	CO3

4	Differentiate between Static Memory Allocation and Dynamic Memory Management. Also give the name of data structure that uses these type of memory management.	CO4
5	a) What are the limitations of Array? 14 10 11 51 43 30 5 55 After how many passes entire values will be sorted using Merge sort.	CO5

Set 5

Sr. No.	Question	CO Number
1	Consider two arrays A and B both contains sorted elements. Write an Algorithm to create an Array C which will contain the elements from both A and B in sorted order.	CO1
2	Suppose Base (AAA) = 999 and w=2words per memory cell for AAA Array. Find address of AAA[451], AAA[135] and AAA[495] and array is Declared as AAA[2500].	CO2
3	24 10 16 51 33 19 5 37 After how many passes entire values will be sorted using Bubble sort.	CO3
4	Let A be a two-dimensional array declared as follows: A: array[0..89][0..196] of integer; Assuming that each integer takes one memory location, the array is stored in row-major order and the first element of the array is stored at the location. Find out the address of the address of the element A[i][j]. 14 10 11 51 43 30 5 55 After how many passes entire values will be sorted using Merge sort.	CO4
5	Suppose following numbers are sorted in an array A: 13 25,26,84,63,21,51,64 Using Binary search find the location of item 84 and 64	CO5

Set 6

Sr. No.	Question	CO Number
1	Consider a multidimensional array: float S[5][7][8]; What will be the memory requirements in bytes of this array.	CO1

2	Here is an array of ten integers: 5 3 8 9 1 7 0 2 6 4 Give step by step execution of Merge Sort.	CO2
3	Write a procedure FIND(DATA,n,loc1,loc2) which finds the location loc1 of largest element and location loc2 of second largest element in an array DATA with n>1 elements. 1 4 10 75 51 83 30 5 12 After how many passes entire values will be sorted using Insertion sort.	CO3
4	What would happen if bubble sort didn't keep track of the number of swaps made on each pass through the list? Justify.	CO5

Set 7

Sr. No.	Question	CO Number
1	What is the difference between constant and logarithmic complexity of algorithm?	CO1
2	If a given an array of 99365 elements, then find out maximum number of comparisons required with Linear search and binary search are?	CO2
3	4 10 77 51 93 30 5 52 After how many passes entire values will be sorted using Selection sort.	CO3
4	Write pseudo code for merge sort, also determine the time complexity of algorithm.	CO4
5	Write an algorithm that will calculate the sum of diagonal elements of a matrix.	CO5

Set 8

Sr. No.	Question	CO Number
1	Given an unsorted array. The array has this property that every element in array is at most k distance from its position in sorted array where k is a positive integer smaller than size of array. Which sorting algorithm can be easily modified for sorting this array and what is the obtainable time complexity? Justify.	CO2

2	Write an algorithm to locate an element in an array at location K. Give explanation in detail. Compute its time complexity for all cases.	CO6
3	Let A be a two-dimensional array declared as follows: A: array[1..599][1..799] of integer; Assuming that each integer takes one memory location, the array is stored in column-major order and the first element of the array is stored at the location. Find out the address of the element A[i][j].	CO3
4	Design an algorithm MIN(A, LB, UB, LOC) which finds the location LOC of the smallest elements among A[LB], A[LB+1], ... A[UB]. 2 4 16 35 81 73 30 15 22 After how many passes entire values will be sorted using Merge sort.	CO4

Set 9

Sr. No.	Question	CO Number
1	Determine the complexities of Bubble sort and Linear search for all cases.	CO1
2	Find out number of comparison required to determine location of an item if array consist of 57756 data elements.	CO2
3	Write a Sub Algorithm to find the largest element from the given array. Illustrate using an example.	CO3
4	Suppose Base (CCC) = 700 and w=4 words per memory cell for CCC Array. Find address of CCC[253], CCC[335] and CCC[165] and array is Declared as CCC[660].	CO4
5	24 58 11 119 37 83 82 191 45 158 130 76 What is the T(N), actual number of statements executed, of the Insertion sort code, given a list of N elements above? What is the Big O?	CO5

Set 10

Sr. No.	Question	CO Number
1	Write an algorithm to Delete an element from an array from location K. Give explanation in detail.	CO1
2	Let A be a two-dimensional array declared as follows: A: array[0..430][0..119] of integer; Assuming that each integer takes one memory location, the array is stored in row-major order and the first element of the array is stored at the location. Find out the address of the address of the element A[i][j].	CO2
3	Write an algorithm for Selection Sort and explain with example. Also discuss the complexity of an algorithm.	CO3
4	Demonstrate an efficient way of storing a sparse matrix in memory. Write a module to find the transpose of a sparse matrix stored in this way.	CO4
5	a) What are the limitations of Multidimensional Array? 34 56 11 51 33 30 5 99 After how many passes entire values will be sorted using Insertion sort.	CO5

Set 11

Sr. No.	Question	CO Number
1	Explain the method to calculate the address of an element in an array. A 25*4 matrix array DATA is stored in memory in 'column-major order'. If base address is 200 and 4 words per memory cell. Calculate the address of DATA [12, 3]	CO1
2	An, array, A contains n unique integers from the range x to y (x and y inclusive where n=y-x). That is, there is one member that is not in A. Design an O(n) time algorithm for finding that number	CO2
3	Arrange the following data items 22,51,27,85,56,23,13,77 in ascending order using bubble sort . Find out no of passes and time complexity for worst case.	CO3
4	Determine ways to find the complexity of an algorithm? What is the relation between the time and space complexities of an algorithm? Justify your answer with an example.	CO4

5	Compare two functions n^2 and $2 \cdot 4n$ for various values of n . Determine when second becomes larger than first. Write pseudo code for above.	CO5
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Set 12

Sr. No.	Question	CO Number
1	Given two sorted lists, L1 and L2, write a procedure to compute L1 L2 using only the basic list operation.	CO1
2	Translate insertion sort into a subprogram INSERTSORT(A,N) which sorts the array A with N elements. Test the program using: 44, 33, 11, 55, 77, 90, 40, 60, 99, 22, 88, 66 D, A, T, A, S, T, R, U, C, T, U, R, E, S	CO2
3	Consider an array MARKS[20][5] which stores the marks obtained by 20 students in 5 subjects. Now write a program to (a) find the average marks obtained in each subject. (b) find the average marks obtained by every student. (c) find the number of students who have scored below 50 in their average. (d) display the scores obtained by every student.	CO3
4	Write an algorithm to find a duplicate numbers in an array. Also display the location of the duplicate numbers. You are free to assume the size of the array and the number of duplicate numbers. Explain the algorithm with an example.	CO4
5	Let A be a two-dimensional array declared as follows: A: array[1..110][1..125] of integer; Assuming that each integer takes one memory location, the array is stored in row-major order and the first element of the array is stored at the location. Find out the address of the address of the element A[i][j].	CO5