UNITED
Group of Institutions
Greater Noida • Allahabad

Department of Computer Science & Information Technology
United College of Engineering and Research
Prayagraj-211010 (India)

Unit-1: DAA Question Bank

Section-A

	Question	CO	Level
1	What is the time complexity of a binary search algorithm?	1	L1
2	What is an algorithm?	1	L1
3	Write the recurrence relation that arises in relation with the complexity of binary search. Solve $T(n)= 2\ T(n/2) + n$.	1	L3
4	An algorithm is made up of 2 modules M1 and M2. If order of M1 is f(n) and M2 is g(n) then what is the order of the algorithm ?	1	L3
5	What is the time complexity of a insertion sort algorithm in all cases?	1	L1
6	Write Heap Sort algorithm.	1	L3
7	What is Pseudo code?	1	L1
8	Discuss any one sorting algorithm having linear time complexity.	1	L2
9	What is stable sort? Name any two stable sort algorithms.	1	L1
10	Explain the term analysis of algorithm.	1	L2
11	Write the Master Theorem.	1	L3
12	What is heap and max heap?	1	L1
14	Write an algorithm for counting sort.	1	L3
15	Discuss the analysis of Heap sort.	1	L2
16	Write an algorithm for Randomized Quick Sort.	1	L2
17	Write the algorithm for Quick sort.	1	L2
18	You are given an array of n integers $a_1< a_2 <a_3 \ldots\ldots<a_n$. Give an O(log n) Algorithm that finds index i where a_i=i or prove that i does not exist.	1	L3
19	Show that $2^{n+1}=O(2^n)$.	1	L3
20	Write an algorithm for Bucket Sort.	1	L2

Section-B

	Question	CO	Level
1	Solve the following recurrences : $T(n) = T(\alpha.n) + T((1-\alpha).n)+n, \quad 0<\alpha<1$	1	L3
2	Consider $T(n) = 2T(n/2) + n^2$, we have to obtain the asymptotic bound using recursion tree method.	1	L2
3	Find the solution of the following recurrence relation : a) $T(n) = 8T(n/2) + 3n^2$, where n>1. b) $T(n) = T(n-1) + n$, where n>1	1	L1
4	Illustrate the functioning of Heap sort on the following array : A = {25, 57, 48, 37,12, 92, 86}	1	L3
5	Illustrate the operation of Counting sort on the array A = {6, 0, 2, 0, 1, 3, 4, 6, 1, 3, 2}	1	L3
6	Write an algorithm for counting sort.	1	L2
7	Discuss the analysis of Insertion Sort.	1	L2
8	Write an algorithm for Randomized Quick Sort.	1	L2
9	Use a recursion tree to give an asymptotically tight solution to the recurrence $T(n) = T(n-a) + T(a) + cn$, where a>=1 and c>0	1	L3

10	Write the Merge Sort Algorithm.	**1**	**L2**

Section-C

	Question	**CO**	**Level**
1	Write the algorithm for Quick sort. Prove that the running time complexity of Quick sort is O(nlogn) in average.	**1**	**L2**
2	Determine the asymptotic order of the following functions: (i) $f(n)=3n^2 + 5$ (ii) $f(n)=2^n + n +3$ (iii) $f(n)=5$ (iv) $f(n)=n + 7$	**1**	**L3**
3	Find the solution of the following recurrence relation using recursion tree method $T(n) = T(n/3) + T(2n/3) + O(n)$	**1**	**L1**
4	Why do we use asymptotic notation in the study of algorithm? Explain in brief various asymptotic notations and give their significance.	**1**	**L4**
5	Solve the following recurrences. . (i)$\mathbf{T(n) = 2T(n^{1/2})+1}$ (ii)$\mathbf{T(n)=5T(n/5)+n/logn}$	**1**	**L3**
6	Solve the following By Recursion Tree Method $T(n) = T(n/5) + T(4n/5) + n$	**1**	**L3**