Design and Analysis of Algorithms Question Bank for IA1

Module 1

Slno	Questions
1	With the help of flowchart explain the various steps of algorithm design and analysis process**.**
2	Explain the concept of asymptotic notations. Explain O, Θ and Ω with examples. Give example for best case, worst case and average case efficiency
3	Explain the general plan for analyzing the efficiency of a recursive algorithm. Suggest a recursive algorithm to find factorial of a number .Derive its efficiency.
4	If f1(n)€O(g1(n)) and f2(n)€O(g2(n)) prove that f1(n)+f2(n) €O(max{g1(n),g2(n)}).
5	If M(n) denotes the number of moves in Tower of Hanoi puzzle when n disks are involved, give a recurrence relation for M(n) and solve this recurrence relation
6	Give the general plan for analyzing the nonrecursive algorithms. Write the algorithm for Matrix Multiplication and find the basic operation count for Matrix multiplication.
7	Give the general plan for analyzing the recursive algorithms. Write a recursive algorithm for finding the number of binary digits in the binary representation of a positive decimal integer. Find the basic operation count A(n) for the same
8	Give an algorithm for Bubble sort. If C(n) denotes the number of times the algorithm is executed ,obtain an expression for C(n).
9	Give an algorithm for Selection sort. If C(n) denotes the number of times the algorithm is executed ,obtain an expression for C(n).
10	Trace Bubble Sort to sort the list 44,66,22,88,55,99,33,11 in increasing order
11	Trace Selection Sort to sort the list 44,66,22,88,55,99,33,11 in increasing order
12	Write an algorithm to compute n! Recursively. Set up a recurrence relation for the algorithm's basic operation count and solve it
13	Explain the method for comparing the order of growth of two functions using limits. Compare the orger of growth of the following functions i) $\log_2 n$ and $\sqrt{n}$ ii) $(\log_2 n)^2$ and $\log_2 n^2$

Module 2

1	Discuss how MergeSort works to sort the list Q,U,I,C,K,S,O,R,T in alphabetical order. Find its time complexity
2	Discuss how Quicksort works to sort the list M,E,R,G,E,S,O,R,T in alphabetical order. Also derive its best,worst and average case time complexity
3	What is divide and conquer technique .Write algorithms to perform Quicksort
4	What is divide and conquer technique .Write algorithms to perform Mergesort
5	Consider the numbers given below. Show how partitioning algorithm of quick sort will place 106 in its correct position. Show all the steps clearly 106, 117,128,134,141,91,84,63,42
6	Explain the Strassen's matrix multiplication with example