DAA - Lectures Taken by JMP-07Dec2020-Online		
Lecture#	**Date**	**Topics**
1	09-12-2020	Syllabus Overview and connection to DSA and AA
		Introduction, Definition of Algorithm
		Correctness
		Hard Problems and scope
		Comparison of Running Times
2	12-12-2020	Power function and logic to reduce multiplication
		Brute force vs Divide and Conquer
		Sorting - Asc - NonDecreasing - Desc - NonAscending
		Selection Sort - without loss of generality with minimum
		Merge Sort example.
		Given two sorted arrays merge them to get sorted.
		Quick sort logic and pivot
		Recursion
3	16-12-2020	Preparing for analysis
		Variations of problem and solutions
		finding minimum, accessing ith element, password requiremnts, search an element
		basic maths: exponent facts, set, addition of n.
4	19-12-2020	Analogy of Insertion Sort Algo: Deck of cards arrangement
		Hashing and Searching - analogy to home stuff arrangement
		Insertion sort algorith, constants and times analysis formula
		Best case if input data is already sorted
		Worst case if input data is reversely sorted
5	21-12-2020	Order of Growth - steps
	AMS-DM	Insertion sort as incremental approach
		Divide, conquer and combine of Merge Sort
		Discussion of merging two sorted subarrays cases
		Discussion of n+lgn; significance is relative term, example of ant, tiger, elephant, dino.
		Why average case is not much discussed? Rather may talk about expected running time.
6	23-12-2020	Analysis of merge sort
		merge two sorted subarrays into single of size n -> order of n
		merge one unsorted arrays of size n - order of nlogn
		using recurrence tree method
7	26-12-2020	Merge Sort example as B+Tree
		Binary Search Time analysis with recurrent tree method - Almost/Complete Binary Tree Path /AVL
		Search Cases Scenarios discussion
		Intro. Asymptotatic notations
8	30-12-2020	Asymptotatic notations definition with graph and related statements
		Definition of recurrence
		Substitution method with solution to recurrence example pmi
Second Session		
9	13-01-2021	Master Theorem
		Example of recursive sqaure matrix multi recurrence
		Example of strassan's matrix maultiplication recurrence
		Example of merge sort recurrence
		Introduction to maximum subarray problem and brute force program v1, v2.
10	16-01-2021	What is n log b a , expression from master theorem; Leaves and levels
		Intutive way of looking at master theorem >, < and =
		Example of Binary Search recurrence
		Limitation of master theorem; gaps. Prerequisite: Formual and regularity check.
		Example of recurrence not following case3 because of falling into gap between case 2 and 3.
11	20-01-2021	Master method based on master theorem
		Fibonacci series time analysis- example of homogeneous recurrence
		Homogeneous recurrences and Inhomgeneous recurrences

		Characterstic Equation phases
12	23-01-2021	Tower of Hanoi recurrence t(n)=2t(n-1)+1 leads theat(2^n) - example of inhomogeneous recurrence
		Change of a variable
		Finding maximum and minimum (3n/2 -2) Vs (2n -2)
13	27-01-2021	Introduction to n-queen problem
		example with tree and data structures
		solution for n=4
14	30-01-2021	permutation tree
		sum of subsets
		basics of backtracking and branch-bound - terminology
		magic number 10 digit - digit location value counts to its occurrances in the number: shared prog
		drawtree-shared prog
15	3-2-2021	backtracking basic idea - where do you save on time comapre to brute force
		Algorithm n queen
		problem state vs solution state vs answer state
		state space vs solution space
		state space tree: The tree organization of the solution space is referred to as the state space tree
16	6-2-2021	N-Queen various solutions and analysis; n^n to n! to ...
		1,4,2,5,8,... what is special about this for 8-queen problem space
		maze as an example - user/manual vs computer generated solutions
		nxnxn further exploration
		Graph, traversal and implementation
3rd Session		
17	17-02-2021	Backtracking general algorithm: Recursive and Iterative.
		Program solution and tracing for nqueen recursive n=4 with tree structure
		Assignment: 0/1 Knapsack problem solution using backtracking
18	20-02-2021	Algorithm Sum of subset problem
		Example with partial tree state diagram
		Trial program to achieve sum of subsets following general backtracking recursion algorithm
		Debugging with VS Code Editor, breakpoint, watch, call stack, step into, step over
19	24-02-2021	Width and Height of state space tree in backtracking: width- distinct values in result set; height-length of result set. Basic understanding. Rec.
		Introduction to graph coloring
		Chromatic number
		Example with partial tree state diagram
		program solution for mcoloring recursive n=4, m=3; input and outputs for other examples.
20	27-02-2021	spiral program to learn more array and pointers
		hamiltonian cycle problem statement and program
		job assignment problem statement
21	03-03-2021	job assignment example trace
		importance of known upper bound
		Thinking of data structures needed
22	05-03-2021	Articulation Point definition
	for Prof.BSB	Finding articulation point algorithm, trace with example.
		DFS of a graph
23	06-03-2021	Branch and bound theory
		n-queen using branch and bound state space tree to understand exploration of nodes in BB
		Heap vs ordered linked list overall (insertion+retrieval)
		Algorithm job assignment problem using BB and heap - only shared.
24	10-03-2021	Topological Sorting of graph
		Example and program
25	16-03-2021	Travelling Salesman Problem - Introduction
		Example
		Algorithm - greedy with limitation, dp
26	17-03-2021	Solution and analysis graphs

		Bitonic euclidean TSP
		triangle inequality
		N! vs TSP_DP pow(n,2)xpow(2,n) crossove point n=8
		Branch and Bound state space tree