

NOTE: Attempt five questions in all, including Question No. 1 (Section -A) which is compulsory and selecting two questions each from Section B-C.

x-x-x

Section-A		
1.	(a) Give recurrence relation for computing complexity of divide and conquer algorithm of merge sort (b) Define implicit and explicit constraints for 8-queen's problem (c) Define P and NP class of problems. (d) Consider the following set of integers. {20, 25, 57, 48, 37, 12, 92, 86, 33} If one uses the quick sort algorithm to sort the above set of integers, how many steps are needed to completely sort the file? Note: you may choose middle element as a pivot? (e) Partial solutions obtained during Kruskal's algorithm are also trees. Justify your answer.	10
Section-B		
2.	(a) Justify $4n^2 + 3n + 2 = O(n^2)$. (b) Write Strassen's matrix multiplication Algorithm	4
3.	(a) Determine the shortest paths to all the vertices which can be reached from source vertex 'A' using Dijkstra's shortest path algorithm. Illustrate each intermediate step.	7
		3
	(b) Give the bounding function for 0/1 Knapsack problem using branch and bound method.	3
4.	(a) What is multistage graph problem? What is the time complexity of multistage graph? (b) For a directed graph, the edge length matrix is given below. Solve the Travelling Salesperson problem using dynamic programming method. Specify its complexity.	7
	$\begin{matrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{matrix}$	
Section-C		
5.	(a) What is sum of subset problem explain with example? (b) What is the difference between recursion and backtracking? (c) Can n queen problem be solved using backtracking? Justify your answer.	2 3 5
6.	(a) How many distinct binary search trees and AVL trees can be created out of 4 distinct keys? (b) Consider a hash table of size and a corresponding hash function of $n \bmod 10$. Compute the locations to which the keys 14, 19, 13, 4, 5, 23, 6, and 15 are mapped using linear probing collision resolution technique. Draw the resultant hash table and determine the total number of collisions occurs. (c) Consider a B+-tree in which the maximum number of keys in a node is 5. What is the minimum number of keys in any non-root node?	4 4 4
7.	(a) Show that job sequence with deadline is NP-hard problem (b) Which one is better KMP algorithm or Boyer-Moore algorithm? Justify your answer. (c) Compare deterministic and non-deterministic problems with help of suitable examples.	2 3 4 3