

2063
M.E. (Information Technology)
Third Semester

MEIT-3105: Advanced Algorithm Analysis and Data Structure

Time allowed: 3 Hours

Max. Marks: 50

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		
Q1.	<p>a) What is the minimum and maximum height for a binary search tree with n nodes.</p> <p>b) Compare P and NP problem.</p> <p>c) Suppose we have $O(n)$ time algorithm that finds median of an unsorted array. Now consider a Quicksort implementation where we first find median using the above algorithm, then use median as pivot. What will be the worst-case time complexity of this modified Quicksort.</p> <p>d) Give control abstract for divide and conquer strategy.</p> <p>e) How many minimum spanning trees are possible using Kruskal's algorithm for a given graph?</p>	10
Section-B		
Q2.	<p>a) Order the following functions in non-increasing order of their growth rate n^2, e^n, 4^n, $n!$, $10n+5\log_e n$.</p> <p>b) Partial solutions obtained during Kruskal's algorithm are also Trees. Justify your answer.</p> <p>c) Give recurrence relation for computing complexity of Quick sort that divides the lists in the ration 1:10 at every step.</p>	3 3 4
Q3.	<p>a) Assuming the graph to be un-directed broadcast graph where vertex 'A' is the broadcast station. The task is to efficiently transfer a piece of information to all the listeners, i.e. vertices other than the broadcast station. The broadcast station sends a single copy of the broadcast message into the network. Each listener forwards the message to any single neighbor, excluding the neighbor that just sent it the message. No listener is allowed to see more than one copy of any message, and all the listeners should see a copy of the message. Apply an efficient solution for the said problem on the broadcast graph illustrating all the intermediate steps.</p> <p>b) Explain Floyd-Warshall Algorithm.</p>	6 4
Q4.	<p>a) Solve the knapsack problem using dynamic programming $n=4$ and $m=25$ (P1, P2, P3, P4) = (10, 12, 14, 16) (W1, W2, W3, W4) = (9, 8, 12, 14)</p> <p>b) Write short note on Multistage graph problem.</p>	6 4
Section-C		
Q5.	<p>a) What is Hamiltonian circuit problem in DAA?</p> <p>b) What is the complexity of n queens problem using backtracking?</p> <p>c) How to solve sum of subsets problem using backtracking?</p>	2 3 5
Q6.	<p>a) List five properties of red-black tree?</p> <p>b) Suppose the numbers 7, 5, 1, 8, 3, 6, 0, 9, 4, 2 are inserted in that order into an initially empty binary search tree. The binary search tree uses the usual ordering on natural numbers. What is the post-order traversal sequence of the resultant tree?</p> <p>c) Compare Binomial and Fibonacci Heap.</p>	3 3 4
Q7.	<p>a) Discuss key feature of the Boyer Moore string matching algorithm?</p> <p>b) Differentiate between NP- complete and NP-hard problems?</p> <p>c) Explain the strategy to prove that a proble.n is NP-hard?</p>	3 4 3