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VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (I.T.: CBCS) IV-Semester Main & Backlog Examinations, May-2019

Design and Analysis of Algorithms

Time: 3 hours

Max. Marks: 60

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Q. No	Stem of the Question	M	L	CO	PO
Part-A (10 × 2 = 20 Marks)					
1.	What is the difference between time and space complexity. Also describe asymptotic notations used for describing the complexity?	2	1	1	1
2.	What is the time complexity of the program given below: <pre>void fun(int n){ int i, j, k, count=0; for (i=n/2; i<=n; i++) for (j=1; j+n/2<=n; j++) for (k=1; k<=n; k=k*2) count++; }</pre>	2	2	1	2
	Solve the same by using any one of the method of your choice.				
3.	Write down the recurrence relation for following algorithms: i) Binary Search ii) Merge Sort	2	2	2	2
4.	Analyze matrix multiplication algorithm among iterative, divide and conquer and Strassen's matrix multiplication.	2	4	2	2
5.	What are the properties of dynamic programming?	2	2	3	2
6.	Write down the algorithm for Relax procedure in Bellman-ford algorithm.	2	2	3	2
7.	Draw a graph with a cycle but with no Hamiltonian cycle.	2	2	4	3
8.	What is explicit and implicit constraints in backtracking?	2	2	4	1
9.	Draw a DAG for the expression $(a+b)*(a+b-c)$ and check whether it is a leaf-one DAG or not.	2	2	5	3
10.	What is polynomial time verification of an algorithm?	2	2	5	2
Part-B (5 × 8 = 40 Marks)					
11.a)	Describe the Master's theorem for all the cases. Solve the following recurrence relations by using Master's theorem. i) $T(n) = 4T(n/2) + n$ ii) $T(n) = 2T(n/2) + n \log n$	4	2	1	1
b)	i) Solve given recurrence relation using substitution method $T(n) = T(n/2) + n$, where $T(1) = 1$. ii) Solve given recurrence relation using recursion tree method $T(n) = 4T(n/3) + n^2$, where $T(1) = 1$	4	3	1	2

12.a) Let us consider a mobile customer care with n customers to be served in the queue. For simplicity assume that the service time required by each customer is known in advance and it is w_i minutes for customer i . So if, for example, the customers are served in order of increasing i , then the i^{th} customer has to wait: $\sum_{j=1}^{i-1} w_j$ minutes. The total waiting time of all customers can be given as $\sum_{i=1}^n \sum_{j=1}^{i-1} w_j$. Give the greedy solution to serve the customers so that the total waiting time can be reduced?

4 4 2 3

b) The characters A to H have the following set of frequencies

4 2 2 2

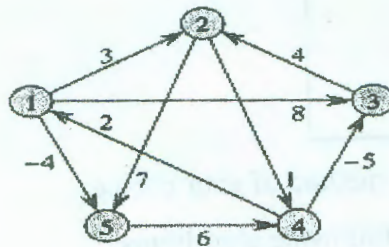
Characters:	A	B	C	D	E	F	G	H
Frequency:	1	1	2	3	5	8	13	21

Use Huffman technique to build the Huffman code tree for the above characters and find the sequence of characters corresponding to the following code.

110111100111010

13.a) Write Floyd – Warshall algorithm for computing All Pairs Shortest Paths (APSP) problem and explain working of Floyd - Warshall algorithm for the following graph.

4 2 3 2



b) A sequence is a palindrome if it reads the same whether we read it left to right or right to left. For example A, C, G, G, G, G, C, A. Given a sequence of length n, devise a dynamic programming algorithm to output the length of the longest palindrome subsequence and give its complexity. For example, the string A, G, C, T, C, B, M, A, A, C, T, G, G, A, M has many palindromes as subsequences, for instance: A, G, T, C, M, C, T, G, A has length 9.

4 5 3 3

14.a) Reduce the given map to an equivalent graph having constraint that no two regions can be of same color. Device an algorithm for graph coloring and calculate its complexity.

4 3 4 2

