Question Paper

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
END SEMESTER THEORY EXAMINATION - NOVEMBER/ DECEMBER 2019
IV SEMESTER B.Sc.(Applied Sciences)in Engg.
DESIGN AND ANALYSIS OF ALGORITHMS [ICS 244]

Marks: 100   **Duration: 180 mins.**

Answer 5 out of 8 questions.

|			
1)	A)	List and Explain the various characteristics of an algorithm.	(5)
	B)	Write and explain the following three asymptotic notations used in the algorithm analysis with suitable examples. i) Big O ii) Big Omega iii) Big Theta	(10)
	C)	If $t1(n) = O(g1(n))$ and $t2(n) = O(g2(n))$ then prove that $t1(n) + t2(n) = O(\max(g1(n), g2(n)))$	(5)
2)	A)	How do you compare the order of growth using limits? Explain	(5)
	B)	Explain Brute force technique with its advantages and disadvantages. Also write Brute-force string matching algorithm.	(10)
	C)	Show in detail the steps to sort the letters of the word SELECTION in alphabetical order using selection sort.	(5)
3)	A)	Explain Decrease and conquer technique with its three variations and examples.	(6)
	B)	Write Pseudocode of DFS using decrease and conquer technique.	(8)
	C)	Write DFS traversal stack and DFS forest for the following undirected graph.	(6)
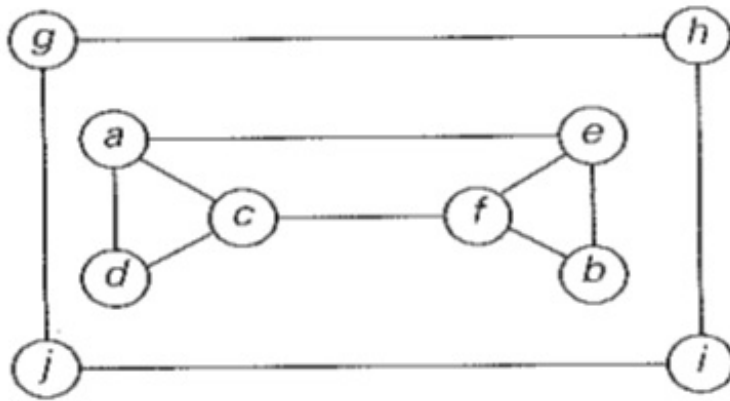
Fig. 3C

4)		Write a recursive function to find the sum of first n numbers stored in an array using divide and conquer technique.	(5)
	A)		
	B)	Write a complete algorithm for mergesort.	(10)
	C)	Derive the time complexity of merge sort using Masters Theorem.	(5)

5)		Given a list of numbers, Write the algorithm to compute the mode based on Presorting Method. Also, compute its worst case time complexity.	(10)
	A)		
	B)	What is meant by a 2-3 tree? Construct a 2-3 tree for the list: 9, 5, 8, 3, 2, 4, 7	(10)

6)		Write the algorithm for Sorting by Distribution Counting. Also, show the sorting process for the list : 13, 11, 12, 13, 12, 12	(12)
	A)		
	B)	Give the pseudocode for Horspool's algorithm along with its worst case time complexity.	(8)

7)		Give the algorithm for computation of binomial coefficient C(n,k) using Dynamic programming algorithm. Also, solve C(5, 2)	(12)
	A)		
	B)	Give the pseudocode for Warshall's algorithm along with its time complexity.	(8)

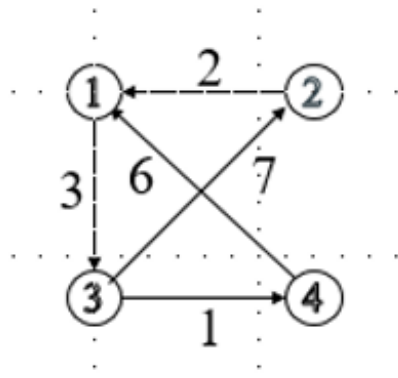| 8) | | Obtain the Huffman's code for the message (m1..m7) with relative frequencies (q1..q7) = (4,5,7,8,10,12,20). | (12) |
| | A) | | |
| | B) | Find the shortest path distance between every pair of vertices for the directed graph given in Fig 8B using Floyd's algorithm. Show all the intermediate steps. | (8) |

Fig 8 B

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