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M S RAMAIAH INSTITUTE OF TECHNOLOGY

(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU)

BANGALORE – 560 054

MAKE UP EXAMINATIONS - JULY 2010

Course & Branch	:	**B.E.(Information Science & Engineering)**	Semester	:	**IV**
Subject	:	**Analysis and Design of Algorithm**	Max. Marks	:	**100**
Subject Code	:	**IS46**	Duration	:	**3 hrs.**

Instructions to the Candidates: Answer one full question from each unit

UNIT-I

1. a) Define an algorithm. Explain the various stages of algorithm design and analysis process with the help of a flow chart. (08)

   b) Explain various asymptotic notations used in analyzing algorithm and prove that (i) $100n+5\varepsilon 0(n^2)$ ii) $\frac{1}{2}n(n-1)\varepsilon\theta(n^2)$ (08)

   c) Consider the following non recursive algorithm (04)

```
Algorithm NonrecursiveS(n)
//input A positiveinterger n
S←1
for i←2 to n do
S←S+i*i*i
return S
```

   i) What does this algorithm compute

   ii) The number of multiplications made by this algorithm

2. a) Explain the general plan for analyzing the efficiency of recursive algorithm. (05)

   b) What is brute force method? Explain the brute force string matching algorithm and trace out the pattern "EXAMPLE" from the text "THIS_IS_A_SIMPLE_EXAMPLE". (10)

   c) Define Exhaustive search. Solve the following Knapsack problem ith given capacity w=8 using exhaustic search. (05)

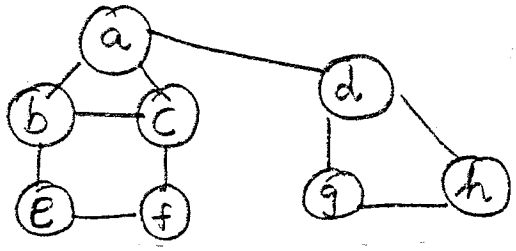
Item	Weight	Value
1	2	$1
2	3	$2
3	4	$8
4	5	$6

UNIT – II

3. a) What is meant by divide and conquer technique. Using this technique find out the time complexity for multiplications of two large integers. (06)

   b) Write down the tree of recursive calls to sort the following set of elements (ascending order) 5,3,1,9,8,2,4,7 using quick sort. (04)

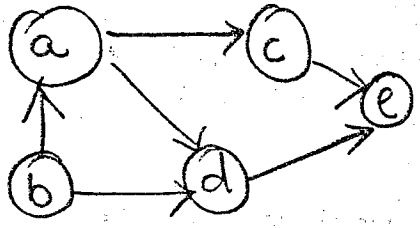
c) Write and explain an algorithm for depth first search, breadth first search and traverse the following graph. (10)



4. a) Write the Johnson tralter algorithm and generate permutation for the given set of numbers {2,4,8}. (06)

b) What is meant by decrease and conquer technique and explain its variations. Write down an algorithm for insertion sort and sort the list "EXAMPLE" is alphabetical order. (10)

c) Apply the DFS based and source removal methods to obtain the topological sorting of the following graph. (04)



UNIT – III

5. a) What is an AVL tree? Construct an AVL tree for the list 15, 16, 18, 13, 12, 14, 17 by successive insertions. (08)

b) Write down the pseudo code for horners rule algorithm and evaluate the polynomial (04)
$p(x)=3x^4-x^3+2x+5$ at $x=2$

c) Write Horspool's algorithm. Create a shift table and apply this algorithm to search for the pattern "BAOBAB" in the text BESS_KNEW_ABOUT_BAOBABS. (08)

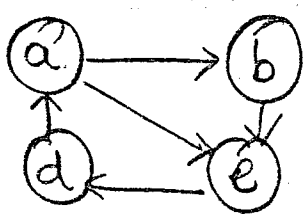
6. a) Define heap. Write down a bottom up algorithm to construct a heap and trace your algorithm for the list 4, 12, 9, 8, 7, 10. (10)

b) Write and explain comparison counting and arrange and following set of elements 50,30, 10,40, 20, 60, 70 in ascending order for the same. (05)

c) What is meant by hashing? For the input A, FOOL, AND, HIS, MONEY, ARE, SOON and hash function h(k)=k mod 13. Construct as hash table using separate chaining, linear probing methods. (05)

UNIT - IV

7. a) What is meant by dynamic programming? Using Warshall's algorithm, find the transitive closure of the following graph. (08)

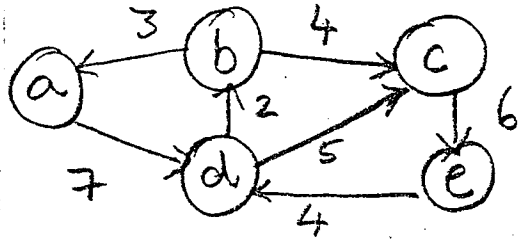


b) Compute the binomial coefficient C(4,2) using dynamic programming. (04)

c) Explain about optimal binary search tree. Obtain a optical binary search tree for the following nodes with probabilities as (08)

do	If	int	while
0.1	0.2	0.4	0.3

8. a) Write a Dijckstra's algorithm to find single source shortest path. Apply this algorithm to get shortest path from vertex a to all other vertices. (08)



b) Consider a Huffman code for the following data (08)

Character	A	B	C	D	-
Probability	0.4	0.1	0.2	0.15	0.15

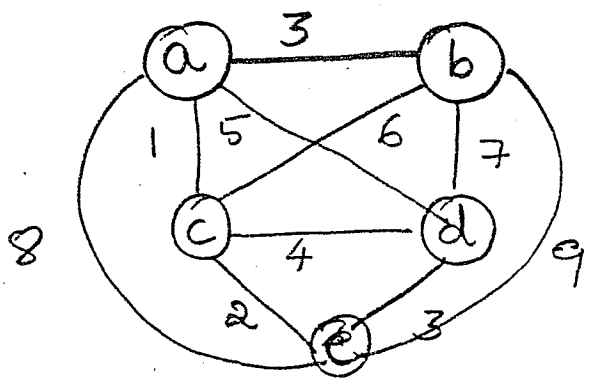
i) Encode the text ABACABAD using the code
ii) Decode the text whose encoding is 100010111001010

c) Differentiate dynamic programming and greedy technique. (04)

UNIT – V

9. a) What are decision trees? Draw and explain a decision trees for searching an element in a sorted array. (08)
b) Briefly explain the concept of P, NP and NP complete problems. (12)

10 a) Obtain all possible solutions to 4-queen's problem. (04)
b) Differentiate Backtracking and Branch and bound technique. (06)
c) Consider the travelling salesman problem as given by following graph. Obtain optimum tour using branch and bound method. (10)



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