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T.E.(Computer) Semester- VI (Revised Course 2007-08) EXAMINATION MAY/JUNE 2019
Modern Algorithm Design Foundation

[Duration : Three Hours] **[Max.Marks : 100]**

Instructions:-
Please check whether you have got the right question paper.
1) Assume Data whenever necessary.
2) Answer any five full questions at least one from each module.

MODULE I

Q.1 a) Using step count method determine time complexity of the following algorithm. **06**

```
Algorithm Check (A, x ,n)
// A [ 1…n] an array containing n elements
i=n;
while(A[i]!=x) i=i-1;
return i;
End
```

b) What do you understand by Recursion? Compare the difference between iterative and Recursive algorithms, with example. **08**

c) With examples discuss the factors to be considered for analyzing the space and time complexities of an algorithm. **06**

Q.2 a) Differentiate between the following **04**
i) Big 'oh' and Little 'oh' Notations
ii) Big 'Omega' and Little 'Omega' Notations

b) Explain the two phases of testing the program. **04**

c) Given a set of numbers S={65,70,75,80,85,60,55,50,45} Demonstrate how the randomized quick sort algorithm works to sort the elements. Also explain the worst case scenario for the algorithm. **08**

d) Explain how the binary search fits in divide and conquer strategy. Discuss the time complexity of best, worst and average scenario. **04**

MODULE II

Q.3 a) Find the optimal solution for the given 0/1 knapsack instance using dynamic programming technique n=5, P(1….5) = (10,15,8,6,7), W(1…5) = (4,6,3,4,2) with the knapsack of capacity 12. **08**

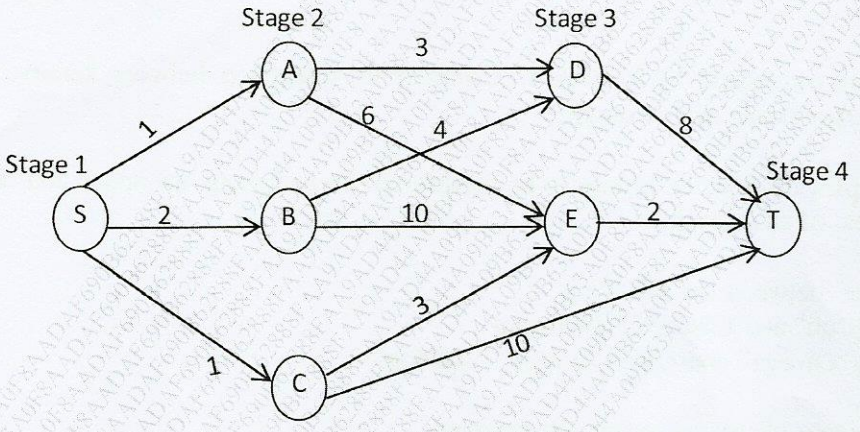
b) Write Kruskal algorithm to find the minimum spanning tree. Compare its time complexity with Prim's MST algorithm. **08**

c) Let there be 5 programs and a computer tape of length 50 bytes. These programs associated with the lengths $(l_1 \ldots\ldots l_5) = (5,10,3,8,7)$ have to be stored on the tape. Find the order which gives the optimal Mean Retrieval Time. **04**

Q.4 a) Solve the following Knapsack instance using greedy strategy where profits P=(11,21,31,33) and weights W=(2,11,22,15) with the capacity M=40. **04**

b) Consider the directed graph G= (V,E, W) where V={1,2,3,4} , E={<1,2>, <1,3>, <1,4>, <2,1>, <2,3>, <2,4>, <3,1>, <3,2> <3,4>, <4,1>, <4,2> <4,3>} and the corresponding weights W={5,2,3,4,2,3,4,2,3,7,6,8}. Find the optimal tour of the graph using dynamic programming assuming source vertex as 2. **08**

c) Obtain the shortest path from the source vertex S to the sink vertex 'T' on the following graph. **08**



MODULE III

Q.5 a) Explain the concept of Hamiltonian cycle in a graph with the help of an example. Further write an algorithm to find all Hamiltonian cycles in a graph. **08**

b) Write short note on Branch and Bound Technique. **04**

c) Draw the state space tree for the graph coloring problem when the number of vertices n=3 and the colors m=3. Write the algorithm for graph coloring problem. **08**

Q.6 a) With the help of an iterative algorithm explain the concept of backtracking. **06**

b) Find the solution for the sum of subset problem also draw the state space generated for the following data. **10**
n=6, M=30, W(1:6) = (5,10,12,13,15,18)

c) Write the estimate algorithm use to estimate efficiency of backtracking. **04**

MODULE IV

Q.7 a) Implement Boyer Moore algorithm on the given text and pattern. **08**
Text: a pattern matching algorithm
Pattern: rithm

b) Explain the following algorithm **08**
i) The Distance Vector Algorithm
ii) Link State Algorithm

c) Explain Trie., standard Trie and its compact Representation. With the help of an example. **04**

Q.8 a) Write Huffman coding algorithm and draw Huffman Tree for the string X. **10**
X= " a fast runner need never be afraid of the dark"
Also get code's for each alphabet.

b) Write an algorithm for finding longest common subexpression in a string (LCS). **06**

c) Write and explain complexity measures of an network algorithms. **04**