C **B4C103S** **Pages: 3**

Reg. No._____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION, JULY 2017

Course Code**: IT202**

Course Name**: ALGORITM ANALYSIS & DESIGN (IT)**

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two questions.

1. a) Write an algorithm to implement Bubble sort. Estimate its space and time complexity and represent it using asymptotic notation. (8)

   b) Write a recursive algorithm for finding maximum and minimum of a set of numbers using divide and conquer method. Show how the algorithm works with an Example. (7)

2. a) What do you mean by Asymptotic notations? List each notation and explain what it signifies. (5)

   b) Solve the recurrence equation using recursion tree method. (5)

   $T(n)=2T(n/2)+c$

   c) Write an algorithm for matrix multiplication using Divide and conquer method. (5)

3. a) Compare the growth of time complexity for the following set of functions. (6)

   i) 2^n and n^2

   ii) $\sqrt{\log n}$ and $\log \log n$

   iii) $n^{\sqrt{n}}$ and $n^{\log n}$

   b) Write a recursive algorithm for implementing Binary search. Illustrate the divide and conquer approach through this algorithm. (9)

PART B

Answer any two questions.

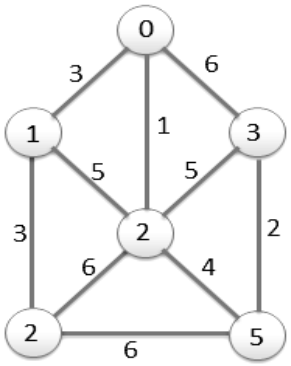
4. a) Explain Knapsack problem. How can we solve it using Greedy approach? (7)

   b) Show how backtracking works on 4- queens problem. (8)

5. a) Why Kruskal's minimum cost spanning tree construction method is considered as Greedy method for problem solving? (7)

b) Write a backtracking algorithm for subset sum problem. (8)

6. a) Draw and explain each stages of executing Prim's algorithm in following graph. (5)



b) Let W = (5, 7, 10, 12, 15, 18, 20) and M = 35. Find all possible subsets of W which sum to M . Draw the portion of the state space tree which is generated. (10)

PART C

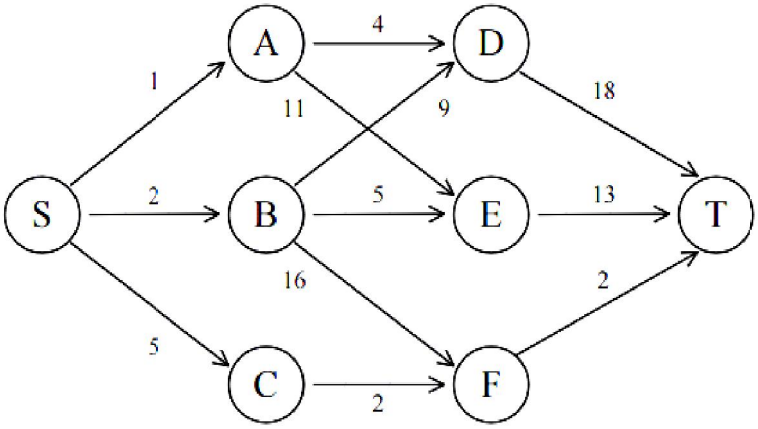
Answer any two questions.

7. a) Write the recursive equation for 0/1 knapsack problem based on the principles of optimality. Explain its execution strategy. (7)

b) Show how Dynamic programming can solve the problem for a given instance. (8)

c) Write the Las Vegas randomized algorithm for quick sort. (5)

8. a) Find the minimum cost spanning tree from S to T in the following multistage graph using Dynamic Programming based on backward approach. (5)



b) Write an algorithm based on Rabin Karp method to find all the occurrences of pattern P[0..m-1] from a given string str[0....n-1], where n>m.

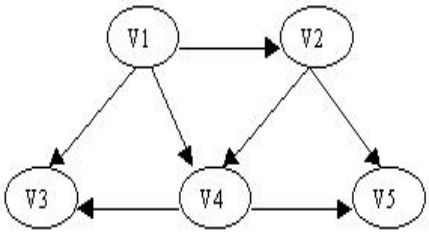
Analyse and Compare the time complexity of this algorithm with the naive approach. (10)

c) Give an appropriate algorithm for graph coloring. (5)

9. a) Write algorithm for all pair shortest path and compute its time complexity. (8)

b) Explain how Oracles and adversary arguments are used in estimating the lower bonds of an algorithm. (7)

c) Perform topological sorting on the given graph. (5)



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