University of Sargodha

BS 4th Term Examination 2018

Subject: Computer Science **Paper: Design and Analysis of Algorithms (CS-3143)**

Time Allowed: 2:30 Hours **Maximum Marks: 80**

Note: Objective part is compulsory. Attempt any four questions from subjective part.

Objective Part (Compulsory)

Q.1. Write short answers of the following in 2-3 lines each on your answer sheet. (16*2)

i. What is algorithm optimality?

ii. What are the different complexities according to which we analyse any algorithm?

iii. What is Merge sort? And is insertion sort better than the merge sort?

iv. What is NP hard and NP complex problems?

v. Define feasible and optimal solution.

vi. Write down three cases of Master Method for solving recurrences.

vii. Which sorting algorithm will perform better if array is already sorted?

viii. What are the drawbacks of dynamic programming?

ix. Differentiate between dynamic programming and greedy approach

x. What is the time complexity of prims algorithm?

xi. How problems are solved using Divide and Conquer approach?

xii. What are the constantans of knapsack problem?

xiii. Define all pair shorted path problem.

xiv. Write an algorithm using Recursive function to find sum of n numbers.

xv. What is the major difference between Dijkstra and Bellman Ford Algorithm?

xvi. Write down the recursive solution for Floyd warshall algorithm.

Subjective Part (4*12)

Q.2. Write down the algorithm for insertion sort and calculate its worst case time complexity.

Q.3. Consider the following algorithm

```
Algorithm Enigma (A[0.. n-1, 0.. n-1])
    for i → 0 to n-2 do
        for j ← i+1 to n-1 do
            if A[i, j] ≠ A[j, i]
                return false
        end for
    end for
        return true
end algorithm
```

i. What does this algorithm compute? [3]

ii. What is its basic operation?

iii. How many times is the basic operation executed? [3 Marks]

iv. What is the efficiency class of this algorithm?

v. Can this algorithm be further imported?

Q.4. Calculate the 'M' and 'S' matrices for matrix chain multiplication problem for the following chain of matrices. Also find out the optimal parenthesis from 'S' matrix.

A_1: 2 x 3 A_2: 3 x 5 A_3: 5 x 2 A_4: 2 x 4 A_5: 4 x 3

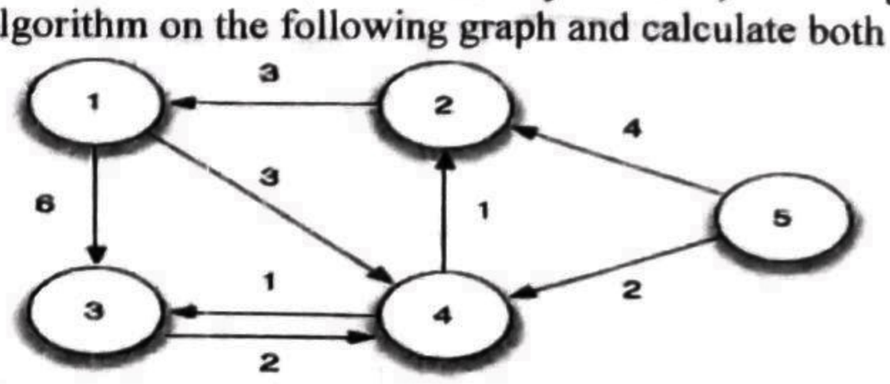
Q.5. For the activity selection problem, suppose that instead of always selecting the first activity to finish, we select the last activity to start that is compatible with all previously selected activities.

i. Does this approach works? [02 Marks]

ii. If this approach works, write down the algorithm that implements this approach. [08 Marks]

iii. Which technique is used in the solution (D.P or Greedy or D&C)? [02 Marks]

Q.6. Run Floyd-Warshall algorithm on the following graph and calculate both the matrices.



Q.7. Define a finite automaton to match pattern ababc over alphabet $\sum = \{a,b,c\}$. Matching pattern ababc in text caabaabcababababccb.