

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? | ✓ ix. Differentiate between dynamic programming and greedy approach |
| ✓ ii. What are the different complexities according to which we analyse any algorithm? | ✓ x. What is the time complexity of prim's algorithm? |
| ✓ iii. What is Merge sort? And is insertion sort better than the merge sort? | ✓ xi. How problems are solved using Divide and Conquer approach? |
| ✓ iv. What is NP hard and NP complex problems? | xii. What are the constantans of knapsack problem? |
| ✓ v. Define feasible and optimal solution. | ✓ xiii. Define all pair shorted path problem. |
| ✓ vi. Write down three cases of Master Method for solving recurrences. | ✓ xiv. Write an algorithm using Recursive function to find sum of n numbers. |
| ✓ vii. Which sorting algorithm will perform better if array is already sorted? | ✓ xv. What is the major difference between Dijkstra and Bellman Ford Algorithm? |
| ✓ viii. What are the drawbacks of dynamic programming? | 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] | iv. What is the efficiency class of this algorithm? |
| ii. What is its basic operation? | v. Can this algorithm be further imported? |
| iii. How many times is the basic operation executed? [3 Marks] | |

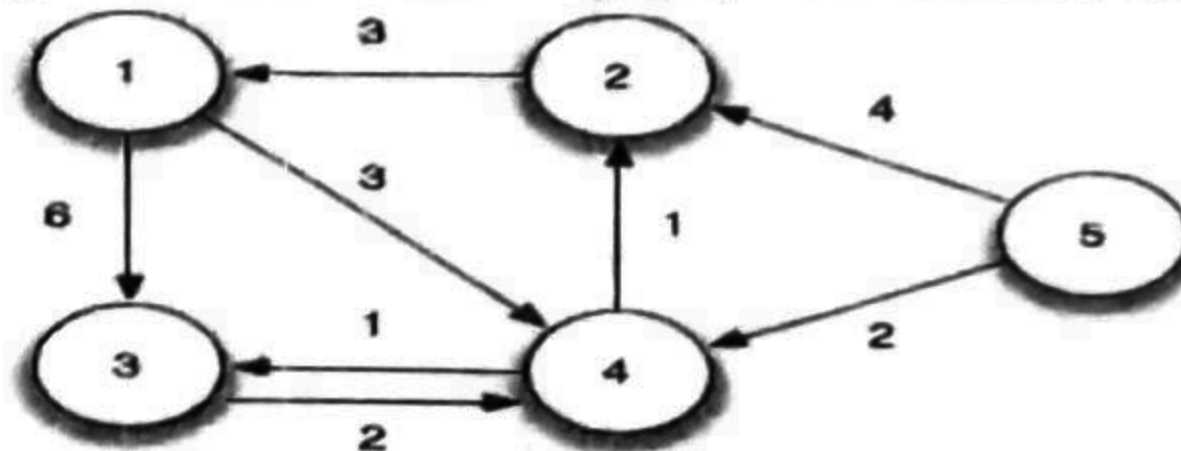
Q.4. Calculate the 'M' and 'S' matrices for matrix chain multiplication problem for the following chain of matrices. Also find out the optimal parenthesis from 'S' matrix.

$A_1: 2 \times 3$ $A_2: 3 \times 5$ $A_3: 5 \times 2$ $A_4: 2 \times 4$ $A_5: 4 \times 3$

✓ **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 $\Sigma = \{a,b,c\}$. Matching pattern ababc in text caabpaabcbabababcccb.**



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