

SUBJECT: DESIGN AND ANALYSIS OF ALGORITHMS

Date: Friday
Day: 24/05/2019

S-2019-2726

Time: 02.30 PM TO 05.30 PM
Max Marks: 60

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Assume suitable data if necessary.

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- Q.1** Take an example of sequential search with unsorted list of numbers to be passed in an array and analyze this algorithm with respect to following (10)
- a) Effect of size of algorithm's input (number of samples)
 - b) Number of matching operations.
 - c) Best-case efficiency.
 - d) Worst-case efficiency.

OR

- Q.1** a) Explain Big-O, Omega and Theta Notations in details and give an examples for each. (05)
- b) Write an algorithm for Knapsack problem using Greedy approach. (05)

- Q.2** Write a pseudo code to implement a stack using linked presentation. (10)

OR

- Q.2** Write a pseudo code to implement a stack using queue data structure. Is it efficient? Justify. (10)

- Q.3** Consider Insertion-Sort and Merge-Sort. For each algorithm, what will be the worst case asymptotic upper bound on the running time if you know additional that (10)
- i) The input is already sorted?
 - ii) The input is reversely sorted?
 - iii) The input is a list containing n copies of the same number?
- For each case and each sorting algorithm, state your answer and justify it.

OR

- Q.3** Give an algorithm to find any element 'K' using sequential search for (10)
- i) Sorted List
 - ii) Unsorted List.
- Explain it with example.

P.T.O.

Q.4 a) For the given instance of a knapsack problem obtain the optimal solution (05)

Item	Weight	Values
01	05	100
02	07	63
03	08	56

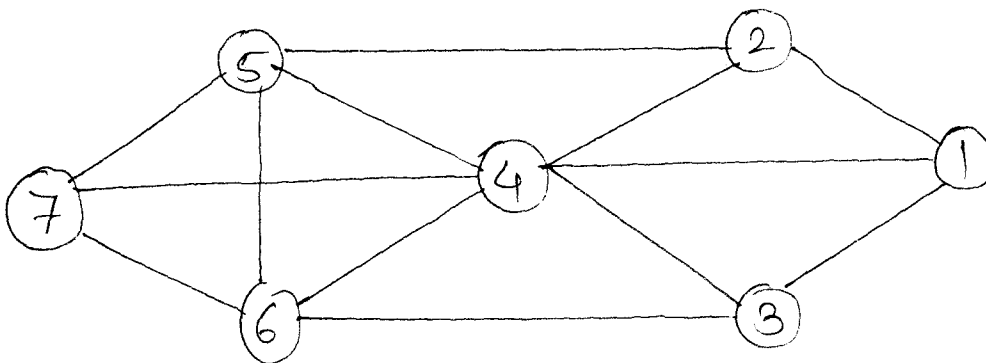
When capacity $W=05$

b) What is single source shortest path algorithm? Explain in brief. (05)

OR

Q.4 Write Dijkstra's Algorithm and explain it in detail with example and analyze its efficiency. (10)

Q.5 Write an algorithm to determine Hamiltonian cycle in a given graph using backtracking. Find Hamiltonian cycles in the following graph. (10)



OR

Q.5 Write backtracking algorithm for: (10)

- The n-queens problem
- Hamiltonian problem
- The subset-Sum problem

Q.6 Explain relationship between NP, NP-complete and NP-Hard. (10)

OR

Q.6 What is meant by non-deterministic algorithm give an example and explain in brief. (10)

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