INTERNATIONAL CENTRE FOR APPLIED SCIENCES
MAHE, MANIPAL

B.Sc. (Applied Sciences) in Engg.

End – Semester Theory Examinations – May 2021

IV SEMESTER – DESIGN AND ANALYSIS OF ALGORITHMS [ICS 244] - Repeaters

(Branch: Computer Science)

Time: 3 Hours **Date: 24 May 2021** **Max. Marks: 100**

- ✓ **Answer any FIVE FULL questions.**
- ✓ **Missing data, if any, may be suitably assumed or calculated**

1A. Explain with an example, why it is logical to investigate an algorithm's efficiency as a function of an input size? [8]

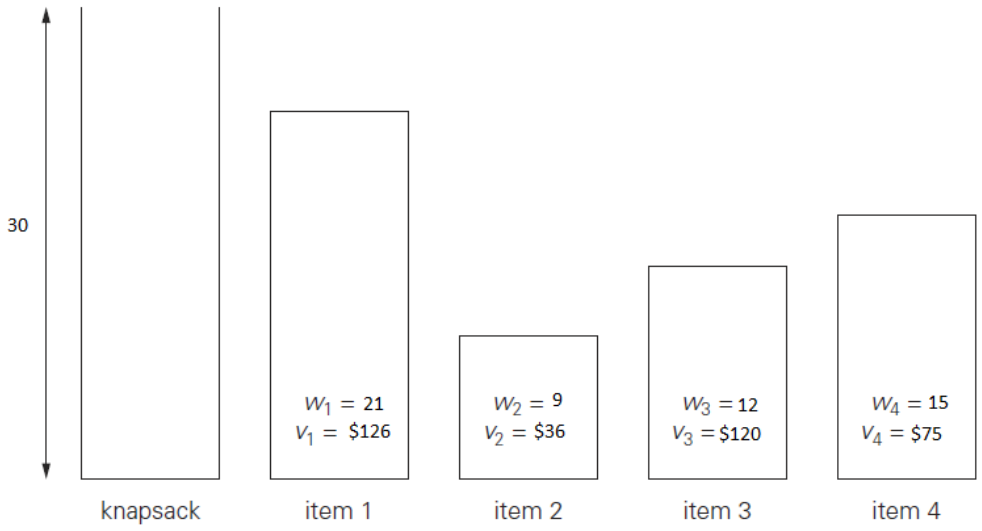
1B. Apply change making algorithm to amount n=12 and use the denominations 2, 6, 8 only.
(i) Show each step and find the total number of coins required.
(ii) Also identify the denomination of each coin for (i). [12]

2A. Explain how to determine the running time of an algorithm? Give an example and show how it is done. [8]

2B. Solve the instance 5, 1, 2, 10, 6, 2 of the coin-row problem using dynamic programming. [12]

3A. Write an algorithm that computes n! recursively and solve the recurrence relation factorial function F(n) = n! for an arbitrary non-negative integer n. [10]

3B. What is a Knapsack problem and why is knapsack problem requires an Exhaustive-search approach? Find the optimal selection for a Knapsack capacity of 30 for the below items. [10]



4A. Write the pseudocode of selection sort algorithm and sort the given list in ascending order: 90, 46, 69, 91, 30, 35, 18. Show each pass of the algorithm. [10]

4B. Compute the time complexity for the above algorithm. How it can be computed with the help of Input size, basic operation, C(n). [10]

5A. Generate a shift-table for the string BARBER and apply Horspool-Matching algorithm for the below sentence: JIM_SAWED_A_BARBERSHOP
In each step, show the value of shift table for the character and shift applied. [8]

5B. How many comparisons (both successful and unsuccessful) will be made by the brute-force algorithm in searching for each of the following patterns in the binary text of one thousand zeros? [12]
a. 00001
b. 10000
c. 01010

6A. For the input 30, 20, 56, 75, 31, 19, construct an open hash table.
Function is defined as h(K) = K mod 11. [8]

6B. Write down the steps of preparing tea with the precision required by an algorithm. [12]
i) Describe in English words (in a free and also a step-by-step form)
ii) Pseudocode

7A. Define O-notation. Plot a graph t(n) ∈ O (g(n)). Prove 100n + 5 ∈ O (n2). [8]

7B. Derive the 2 basic rules of sum manipulation and 2 summation formulas. [12]

8A. Write the pseudocode of an algorithm that implements sequential search with a search key as a sentinel and trace the same with help of an example. [10]

8B. Find best possible for assignment for the data given below. [10]

	Job 1	Job 2	Job 3
Person 1	3	4	5
Person 2	2	3	7
Person 3	8	9	2

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