PROBLEM SOLVING AND ALGORITHMS

Q1: A traveller arrives at hotel he has no money but only a silver chain consisting of 6 links. He uses one link to pay for each day spent at the hotel but the hotel manager agrees to accept no more than one broken linkHow should the traveller cut up the chain in order to settle the amount with the hotel manager on a daily basis.

1. what is the least number of links that have to be cut if the traveller stays 100 days at the hotel and has a chain cosisting of 100 links? what is the answer in general case n days and n links

Algorithm:

step1: Initialize cuts = 0 and position = 1

step2: While position ≤ n

1.Cut the link at position

2.Increase cuts by 1

3.Double the position (position=position\*2)

step3: Stop when position > n

step4: Return the total number of cuts

Q2. Rearrange the letters in the words new door to make one word.

Algorithm:

step1: Take the input string "new door"

Step2: Remove spaces to get "newdoor"

Step3: Generate all possible rearrangements

Step4: Check if any rearrangement forms a valid word

Step5: Return the valid word "oneword".

Q3:do divide and conquer for the array [6 ,5 ,1 ,4 ,3 ,2]

Algorithm:

Step 1: Split the array into two halves until each sub-array has one element.

[6, 5, 1, 4, 3, 2]

=> [6, 5, 1] and [4, 3, 2]

=> [6] [5,1] and [4] [3,2]

=> [6] [5] [1] and [4] [3] [2]

Step 2: Conquer (Sorting & Merging)

=> Merge [5] and [1] → [1,5]

=> Merge [3] and [2] → [2,3]

=> Merge [6] and [1,5] → [1, 5, 6]

=> Merge [4] and [2,3] → [2, 3, 4]

=> Merge [1,5,6] and [2,3,4] → [1, 2, 3, 4, 5, 6]

Step3: display the final sorted array[1, 2, 3, 4, 5, 6].

Q4. Draw flowchart for calculating simple interest

