Tutorial Session 8

1. Consider the following queue characters, where QUEUE is a circular array that is allocated six memory cells:

   FRONT=2, REAR=4, QUEUE: __, A, C, D, __, __

   Examine the following operations:

   i) F is added to the queue. _ A C D F _ f=2, r=5

   ii) Two letters are deleted. _ _ _ D F _ f=4, r=5

   iii) K, L, and M are added to the queue. L M _ D F K f=4, r=2

2. You have three pegs and a stack of n disks of different sizes, which can slide onto any peg. The puzzle starts with the disks in ascending order of size on one peg, with the largest disk at the bottom. You need to move the entire stack to another peg, following these rules:

   i. Only one disk can be moved at a time.

   ii. A disk is slid off the top of one peg onto another peg.

   iii. A disk can only be placed on top of a larger disk or an empty peg.

   Find the recursive and closed-form solution for the above Tower of Hanoi problem, and print the sequence of moves required to transfer all the disks from one peg to another while adhering to the rules.

3. Suppose there are n people (numbered from 1 to n) standing in a circle, and you are asked to count around the circle in a fixed direction (e.g., clockwise) and eliminate every kth person until only one person remains. The goal is to find the position (or number) of the last person remaining. Find out which person will survive using Josephus's problem for a group of n=1000, 5000, and 100,000 people. Find out the time complexity of your solution.

O(n)