



**Ahmedabad  
University**

CSE332: Operating System

Prof.: **Priyesh Chaturvedi**

TAs: **Manavkumar Vagrecha, Bhumiti Gohel**

Assignment Submitted by: **Krina Khakhariya**

**(AU1940208)**

## Question 1

In this question, we have to print pattern in this fashion 'A 1 a B 2 b C 3 c ... Y 25 y Z 26 z'. Here I have implemented this pattern with the help of multithreads. Also I have created three threads to execute such pattern. Threads like func\_num, func\_small and func\_caps. And at last I have combined it with join function. While multithreading is a kind of program which allows us to create multiple threads within a single process, executing thread concurrently and independently with sharing process resources. Threads are running in parallel here.

## Question 2

In this question, the buddy system here implements by a free nodes list, with all different possible power of 2. Data is to be maintained with the help of a Map structure (Hashmap) with the starting address of segment as key and size of the segment as value and update it whenever an allocation request comes. Deallocation request comes to check the map to see if it is valid request. If it is so, then we add a block to free other tracking blocks. After that, we need to search the free list to check whether buddy is free and it is then we will merge the blocks and again put them in free list otherwise not to coalesce and to simply return after that.

It requires few terms like buddyNumber, and buddyAddress. The sequence followed as a allocation request first then deallocation request.

· If  $2^{U-1} < w \leq 2^U$ : Allocate the whole block

## Question 3

In this question, Producer and consumer problem and its solution using semaphores and mutex. Mutex provides mutual exclusion when consumer or producer will have their own mutex key to go further in their process. Till buffer is getting filled by the producer, the consumer will have to wait. Same way till buffer is not empty producer have to wait. At any point of time, only one thread can work with the entire buffer. The concept can be generalized using semaphore. But again in binary semaphores looks like mutex.