**National University of Computer and Emerging Sciences, Lahore Campus**

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|  | **Course:** | **Operating Systems** | **Course Code:** | **CS 2006** |
| **Program:** | **BSCS [ 4A, 4B ]** | **Semester:** | **Spring 2024** |
| **Due Date** | **24-April-2024 at 11:59 pm** | **Total Marks:** | **50 marks** |
| **Type:** | **Assignment 5** | **Page(s):** | **2** |
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**Important Instructions:**

* **You are not allowed to copy solutions from other students. We will check your code for plagiarism using plagiarism checkers. If any sort of cheating is found, heavy penalties will be given to all students involved.**
* ***Late submission of your solution is not allowed.***
* ***No further extension will be provided in any case.***

***Question 1:***

*Consider a scenario where a library has 3 study rooms, each with a limited capacity of 4. Students can enter the library and occupy study rooms to study. However, if all study rooms are occupied, new students must wait until a study room becomes available.Your task is to implement a solution using counting semaphores to manage the access to study rooms in the library. The solution should ensure the following:*

*Students can enter the library and occupy study rooms if available.*

*If all study rooms are occupied, new students must wait until a study room becomes available before they can enter the library.*

*Students should leave the study room when they are done studying, making the room available for other students.*

***Question 2:***

Consider a scenario where there are multiple students trying to access a limited number of computers in a computer lab. The computer lab has a total of 10 computers. Each student can use the lab to access a computer for a fixed duration of time to complete their assignments.

Your task is to implement a solution using counting semaphores to manage the access to computers in the lab. The solution should ensure the following:

Students can enter the lab and access a computer if available.

If all computers are in use, new students must wait until a computer becomes available before they can enter the lab.

Students should release the computer when they are done using it, making it available for other students to use.

***Question 3****:* ***Dining Philosophers Problem***

*Implement a solution for the dining philosophers problem using semaphores.*

**NOTE : use semaphores library for implementation.**

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