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| **CS-205 Operating Systems** |
| **Assignment 1 Marks 20** |

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| **Assignment Cover Sheet** | |
| Student name: |  |
| Student ID |  |
| Instructor’s Name: | Salma Kulsoom |
| Deadline: | November 07, 2022 |
| Student declaration: | I declare that:   * This evaluation is my very own work and wherein other’s works or thoughts were used, I even have accurately referenced or stated them * I recognize that plagiarism is a critical offense that could cause disciplinary action. |
| Student signature: |  |

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| Submission Instructions |
| * Submit the handwritten assignment in hard copy. * You do not need to type or print out the assignment. * Do not write questions, just mention the question number and answer it. * Your assignment must be written in a neat and understandable format with a proper cover page. Print this first page and attach it as the first page of your assignment. Cover pages other than this one will not be accepted. * Show complete steps of calculations. * DO NOT copy anything from anyone else as it will result in the cancellation of the assignment |

**Note: Solve these problems by showing the process. They are too simple, just execute them line by line and think about preemption. These types f question will be part of your S II paper.**

**Question 1:**

Suppose there are four binary semaphore m[0], m[1], m[2], m[3] shared among four processes. Each of the four process contains the following piece of code.

{

wait (m[i]);

wait (m[(i+1) mod 4]);

Critical Section;

signal (m[i]);

signal (m[(i+1) mod 4]);

}  
  
based on the semaphore each process is waiting on, will these processes enter into a deadlock? Further, is there chances of starvation?

**Question 2:**

Suppose there are three concurrent processes A, B, and C executing in a system, all with a critical section to access a shared variable.

* Process A executes the wait() operation on semaphore w, x and y.
* process B executes the wait() operation on semaphores x, y and z.
* process C executes the wait() operation on semaphores y, z, and w before entering into their respective critical sections.

After completing the execution of critical section, each process invokes signal() operation on its three semaphores. All of the four semaphores are binary semaphores and are initialized to 1.

Which one of the following sequence represents a deadlock-free order of executing wait operation by the processes?

1. A:wait(w)wait(x)wait(y)  
   B:wait(x)wait(y)wait(z)  
   C:wait(y)wait(z)wait(w)
2. A:wait(x)wait(w)wait(y)  
   B:wait(y)wait(x)wait(z)  
   C:wait(w)wait(y)wait(z)
3. A:wait(w)wait(x)wait(y)  
   B:wait(y)wait(x)wait(z)  
   C:wait(y)wait(z)wait(w)
4. A:P(x)P(w)P(y)  
   B:P(x)P(y)P(z)  
   C:P(w)P(y)P(z)