National University of Computer and Emerging Sciences, Lahore Campus

Course:	Operating Systems	Course Code:	CS 2006
Program:	BSCS [4A, 4B]	Semester:	Spring 2024
Due Date	1-April-2024 at 11:00 pm	Total Marks:	50 marks
Type:	Assignment 4	Page(s):	1

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: Develop a C program that converts binary numbers stored in a matrix of size *m*×*n* into their decimal equivalents using multithreading. The program should prompt the user to input the dimensions of the matrix, where *m* represents the number of rows and *n* represents the number of columns. Each element in the matrix consists of either 0 or 1, representing a binary number. Upon receiving the matrix input, you are supposed to perform following task, If the last digit of the student ID ranges from 0 to 4, the program will create threads equal to number of columns 'n' and each thread will convert binary number in each column into decimal. Conversely, if the last digit of the student ID ranges from 5 to 9, the program will create threads equal to number of rows 'm' and each thread will convert binary number in each row to decimal.

Question 2*:*
A barbershop consists of a waiting room with n chairs, and the barber room containing the barber chair. If there are no customers to be served, the barber goes to sleep. If a customer enters the barbershop and all chairs are occupied, then the customer leaves the shop. If the barber is busy, but chairs are available, then the
customer sits in one of the free chairs and wait. If the barber is asleep, the customer wakes up the barber. Write a C program using **semaphores** to coordinate the barber
and the customers.
