**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** | **14-March-2024 at 11:59 pm** | **Total Marks:** | **60 marks** |
| **Type:** | **Assignment 2** | **Page(s):** | **1** |
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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****:*

Write a C program that uses fork to create a child process. The child process should display its process ID (PID), and the parent process should display the PID of the child.

***Question 2****:*

Create a C program that simulates a simple bank account system. Use fork to create child processes representing different account holders. Implement deposit and withdrawal operations with proper synchronization.

***Question 3:***

Develop a C program that creates a child process to find and print all prime numbers in a given range. The parent process should specify the range, and the child process should perform the computation.

***Question 4:***

Design a program using ordinary pipes in which one process sends an integer array to its child, and the child calculates its sum and sends it back to the parent. The parent displays the result. This will require using two pipes, one for sending the original message from the first to the second process and the other for sending the modified message from the second process back to the first process.

***Question 5:***

Create a communication program using Mahad.c and Haider.c processes. Mahad should send a message to Haider through named pipes. Haider, upon receiving the message, must reverse the case of each character and send it back to Mahad, who will then print the reversed case message on the screen. For example, if the Mahad sends the message "What's Up," the Haider will return "wHAT'S uP."

***Question 6:***

Create 2 independent programs (sender.c and worker.c) that perform communication using named pipes. One program will be the worker program that will wait for sender to send some data via a named pipe. The data sent is as follows: Operator operand1 operand2 The operands can be +, -, \*, /. The worker will then apply the operator on the operands and return the result to sender via named pipe. The sender will then print the result on the screen For example, if the following is sent: + 4 10 Then the worker will calculate 4+10 and return 14 to sender via the pipe which will then print it.

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