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

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| final design | **Course:** | **Operating Systems** | **Course Code:** | **CS 2006** |
| **Program:** | **BS(DS/SE)** | **Semester:** | **Fall 2023** |
| **Section:** | **BDS-5C & BSE-5A** | **Total Marks:** | **35** |
| **Assignment:**  **Due Date:** | **1**  **17 September,2023** | **Pages** | **(2)** |



**Important Instructions:**

**1. Submit each question file named as your roll number along with the question number., i.e., 21L-1111\_Q1.c**

**2. 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.**

**3. Late submission of your solution is not allowed.**

**Question 1: Custom Shell [15 marks]**

In this question, you will develop your own version of shell. Your shell should execute the following commands when given by the user:

* cp
* mkdir
* ls

The steps involved will be as follows:

1. User types a command, such as “cp ./OS ../newOS”. The command will be stored in a character array or a string object.
2. Shell will perform tokenization and separate the command and its arguments.
3. Shell will create a child process and use **execvp** system call to execute the command.
4. Shell will wait for the command to finish execution.
5. After the command has been executed, shell will ask the user to enter the command again.
6. Shell will exit when the command given by the user is “exit”.

**Question 2: [10 marks]**

Write a program in C/C++ which is passed as command line argument a file name. Your program will read the following data from the file using read system call.

* roll number (string)
* marks (int)
* grade (char)

The main process will then fork two child processes. The task of the first child is to print the previously available data in the file. The second child will update student grades from previous I (incomplete) grades using the following grade scheme:

80-100 A

70-79 B

60-69 C

50-59 D

< 50 F

and write the updated data of each student (with grades assigned) to a file named output.txt

**Question 3: [10 marks]**

Write C/C++ code that asks the user for input between 1 to 10. It then creates that many processes such that each process is a parent of exactly one process, except one. The last process is not the parent of any process. In this program, you have to take input from the terminal. Print the pid of each process along with the pid of the parent process to show the correctness of your program.