National University of Computer and Emerging Sciences, Lahore Campus

Course Name:	Operating Systems	Section:	BCS-4G
Program:	BSCS	Semester:	Spring 2023
Duration:	2 Hours	Total Marks:	60
Evaluation Type:	Lab Mid Exam	Weightage:	30%
Name:		Roll Number:	

Instructions:

- **The quality of the code will affect the marks.**
- Students will receive **ZERO** marks if the answers are plagiarized.
- Use of ANY helping material/code, or cell phones, **INTERNET** and flash drive are strictly prohibited.
- You can use Linux man pages for help.
- You must ensure proper submission of your code following the file naming instructions (given below).
- No queries will be entertained.
- Your submission will contain your **CODE**.
- Submission location: Google Classroom.

File Naming Instructions:

- Name your each individual file as **ROLLNUMBER_QUESTION_FILENAME.c** for example **20L_1234_question1_speaker.c**
- **5 marks will be deducted if the naming instructions are not followed.**

Question 1: (45 Marks)

- Write and use **makefile** to **compile** all the programs.

- Create an application using 4 C files named **create_fifo.c**, **main.c**, **worker1.c**, and **worker2.c.**
- **create_fifo.c** creates a pipe named **fifo_pipe.**
- **main** reads a sentence from an **input file** via read() system call, but have to use **FD # 0** and call appropriate **redirection** system calls.

i.e. **read(0, buffer, 200)**

- **main** also **executes** two programs **worker1** and **worker2**.
- **worker1** calculates the **frequencies** of the stop words from the sentence.
- It also writes the frequencies to the **fifo_pipe** with **write** system call, but have to use **FD # 1** and call appropriate redirection system calls.

i.e. **write(1, stopword_frequencies, size)**

- **worker2** counts the **number** of words in the sentence and **average word length**.
- It also writes the both things to the **fifo_pipe** with **write** system call, but have to use **FD # 1** and call appropriate redirection system calls.

i.e. **write(1, sent_length_and_avg_word_length, size)**

- **main** has to read the **output of both workers** and **display** them in the **screen** with proper formatting.

List of stop words: **[a, the, an, of, to, in, and]**

Note 1: FD means File Descriptor

Note 2: Strictly follow the naming instructions given at the start of paper.

Question 2:   (15 Marks)

- Create 2 programs (2 separate files) named **main.c,** and **frequencies.c**
- Also create a **header file** that contains the prototypes of **all the functions** you will use in the rest of the 5 programs e.g. reverse(), vowel_freq(), cons_freq(), etc.

- The **main** program takes a string from the user, through command line arguments or during the program execution.
- It prints it on the screen along with its **PID**.
- Then it **executes** the **frequencies** and passes the string to it through an **ordinary pipe**.
- **frequencies** counts the frequencies of vowels and consonants in the string and prints them on the screen along with its **PID.**
- Write and use **makefile** to compile all the programs.

Note: Strictly follow the naming instructions given at the start of paper.

*********** GOOD LUCK ***********