National University of Computer and Emerging Sciences

# Operating Systems (CS2006)

# Sessional-I Exam

Date: February 24th 2025

**Course Instructor(s)**

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**Total Time: 1 Hours**
**Total Marks: 15**
**Total Questions: 02**

**Semester:** SP-2025
**Campus:** Karachi
**Dept:** Computer Science

Student Name _____ Roll No _____ Section _____ Student Signature _____

***CLO # 1: Describe, discuss, and analyze, services provided by the modern Operating Systems.***

**Q1.** [1.5 marks x 5 = 7.5 marks]

Write short textual answers.

*Note: No Drawings. Explain all technical terms in your answer to get full marks.*

a) What are the Pros and Cons of a Microkernel OS implementation. Explain. [1]

b) Consider three long running processes P1, P2 and P3. For a time, slice of ten microsecond, explain all actions which the scheduler takes to run these processes. [2]

c) What action does OS take to manage each type of software interrupts? [1]

Give only labelled diagrams (DO NOT use pencil). [2 + 2] *Note: No grading of textual answers here.*

d) Show how a system call originates from a user executable, how OS completes it and return control back to the same executable. *Note: Deduction of marks for each missing step, label, and errors in flow of execution.*

e) Draw a read queue implemented as a linked list with two processes. Label all elements of one PCB in this list to show your understanding of its contents. Now, draw a labelled process memory map. Show which part of memory map contains process's static and dynamic variables.

***CLO # 2: Understand, design, and implement solutions employing concepts of Processes/Threads.***

**Q2.** [3.5 marks + 4 marks = 7.5 marks]

Understanding code semantics

a) Suppose a process executes the code shown in Figure 1. Dry run the execution by showing all variable values and other work. Also, draw the relationship between the resulting processes with brief descriptive hints. [1.5 + 2 = 3.5]

```
v1=fork();
v2=fork();
v3=fork();
if (v3==0)
  fork();
```

Figure 1

Code Implementation

b) Write a C program that creates three processes. Each process prints 5 integers each from an array {1,2,3,4,5,6,7,8,9,10,11,12,13,14,15}. What output will appear on the screen? Explain why it appears in the order you have written it on your answer sheet. [2 + 1 + 1 = 4]