



COMSATS University Islamabad, Lahore Campus

Midterm Examination – Spring 2024

Course Title:	Operating Systems	Course Code:	CSC 323	Credit Hours:	03
Course Instructor/s:	Mr. M Mudassar, Mr. Nadeem Ghafoor Ch, Ms. Zeenat Afzal	Program Name:	BSCS, BSSE, BSEE, BSCE		
Semester:		Batch:		Section:	
Date:	24/04/2024				
Time Allowed:	90 Minutes		Maximum Marks:	25	
Student's Name:			Reg. No.		
Important Instructions / Guidelines:					
<ul style="list-style-type: none">Write to the point and avoid unnecessary details.					

Question No 1: CLO: <1>: Bloom Taxonomy Level: <Understanding> [2 + 3 + 3 = 8]

- Modern CPUs have two execution modes i.e. kernel mode and user mode, why do we need the two modes?
- What is a virtual machine and what are its benefits, give an example.
- Using an example explain how a normal user program executes a system call?

Question No 2: CLO: <2>: Bloom Taxonomy Level: <Analyzing> [2 + 6 = 8]

- What is the difference between waiting time and response time? Under what situation(s) are these equal?
- Given the following arrival time, burst time and Priority for each process, draw the **Gantt chart** and compute the **average waiting time** for the following CPU scheduling algorithms. Note: (Do not consider context switch time and resolve the clash (if any) based on FCFS).

Job	Arrival Time	Burst Time	Priority
A	0	8	3
B	2	4	2
C	4	5	1
D	6	6	2
E	8	2	1

- Shortest Remaining Time First.
- Round-Robin with time quantum of 3 units.
- Non-Preemptive priority (A lower number indicates a greater priority).

Question No 3: CLO: <2>: Bloom Taxonomy Level: <Analyzing> [2 + 2 + 5 = 9]

- Differentiate between binary and counting semaphore?
- Explain the implementation of wait () and signal () operations in semaphore?
- Select the usage of wait() and signal() operations to synchronize processes A, B, C, D, E and F by using semaphores so that process A must finish executing before B starts, process B must finish before C or D starts, and process D must finish before process E or F starts. F should finish last. Show your solution. You should assume three semaphores **S1, S2, S3 and S4** and all **initialized to zero**. Note: All processes must be executed once.

Do your own work, some One is watching!

Best of Luck 🍀