Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science & Engineering
Mid Examination, Summer 2025
Course Code: CSE 323 , Course Title: Operating Systems
Level: 3 Term: 3 Batch: 62

Time: 01:30 Hrs **Marks: 25**

Answer ALL Questions [Optional]

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	*a)*	Differentiate between batch, real-time, and distributed operating systems based on interaction, resource management, and scheduling.	[3]	**CO1**
2.	*a)*	Plugging in a USB mouse immediately results in it being usable without restarting the system. (i) List the key components of an operating system that are involved when a USB mouse is connected to a running system. (ii) Explain the sequence of events that occur behind the scenes at the operating system level.	[3]	**CO1**
3.	*a)*	A software company is developing a lightweight OS for IoT devices that have limited memory and computing power. The team must decide which architecture to use for designing the system. Recommend the most suitable os structure for the mentioned scenario and justify your choice in terms of modularity, performance, and reliability.	[5]	**CO2**
4.	*a)*	Write a C program in which a parent process creates a child process. The child process should execute a new program located at /usr/local/bin/log_cleaner. Make sure to execute necessary system calls for the parent and child process to finish appropriately.	[4]	**CO2**
5.	*a)*	A small team is developing a multi-user chat application that runs on a shared server. Each user message is handled as a separate process. To ensure fairness, the development team decides to use the Round Robin CPU scheduling algorithm with a time quantum of 3 ms where the system receives the following processes: Process / Arrival time / Burst Time P1 / 0 / 10 P2 / 1 / 4 P3 / 2 / 6 P4 / 3 / 7 **i.** Draw the Gantt chart using Round Robin (preemptive) scheduling. Calculate the waiting time and turnaround time for each process. **ii.** Comment on how Round Robin scheduling ensures fairness in this chat server scenario. Identify one potential drawback in real-time responsiveness.	[5]	**CO3**

	b)	Consider the following set of processes scheduled using preemptive priority scheduling, where a lower priority number indicates a higher priority. Assume that context switch time is negligible and all times are in milliseconds.	[5]	CO3

Process	Arrival time	Burst Time	Priority
P1	0	7	2
P2	1	4	1
P3	2	6	4
P4	4	3	3

i. Draw the Gantt chart showing the execution order of processes under preemptive priority scheduling. Calculate the waiting time and average waiting time.

ii. Explain how preemptive priority scheduling differs from the non-preemptive version, especially in terms of response time and fairness.