EAST WEST UNIVERSITY
Department of Computer Science and Engineering
B.Sc. in Computer Science and Engineering Program
Mid Term II Examination, Spring 2022

Course: CSE325 – Operating Systems, Section-1
Instructor: Md. Nawab Yousuf Ali, PhD, Professor, CSE Department
Full Mark: 20
Time: 1 Hour and 20 Minutes

Note: There are SIX questions, answer ALL of them. Course outcomes (CO), cognitive levels and marks of each question are mentioned at the right margin.

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1. Suppose you need to build a system where you need to schedule the processes namely P0, P1, P2, and P3 in such a that these processes have minimal average waiting time. Suggest which scheduling algorithm should be used to execute all these processes. Briefly explain your reasoning. [CO2, C3, Mark: 2]

2. Consider the following set of processes with the length of CPU burst time given in milliseconds [CO3, C4, Mark: 5]

Process	CPU burst time	Arrival Time
P3	6	0
P4	3	1
P1	4	2
P0	15	3
P2	7	4

Draw the graph (Gantt chart) and compute average waiting time for the following processes using Shortest Job First (**SJF**) & Round Robin (**RR**) algorithms (Quantum = 5)

3. In lock variable method a process P1 checks the lock variable and finds that there isn't any process in the critical section. However, before updating the value of lock variable, context switching occurs. Another process P2 now wants to enter the critical section and checks the lock varibale. P2 enters the critical section and and updates some of the common varibale. Now, P1 again enters the critical section. Then P2 leaves critical section after updating the lock variable while P1 is still in the critical section. Now P3 wants to enter the critical section. Suggest what could occur in this scenario. Provide program example. [CO2, C3, Mark: 3]

4. Consider the following set of processes with the length of CPU burst time given in milliseconds [CO2, C3, Mark: 3]

Process	CPU burst time	Arrival Time
P3	6 5	0
P4	3	1
P1	4	2
P0	15	3
P2	7	4

Draw the graphical representation of the schedule of tasks and compute the turnaround time for each of the processes using Shortest Remaining Time First (**SRTF**) algorithms.

5. In disabling interrupt synchronization method, a process must disable interrupt just after entering a critical section and re-enable it just before leaving it. In a multiprocessor system, a particular process P1 disables interrupt after entering a critical section by using one CPU and meanwhile another CPU has interrupt enable flag set to 0. Another process P2 wants to enter the critical section by using any of the two CPUs. Suggest what could occur in this scenario. [CO2, C3, Mark: 2]

6. In a producer-consumer problem, the variable counter is executed in some microinstructions. Currently, there are 4 items inserted in the buffer by the producer. Consumer did not start consuming any item yet. Now when consumer wanted to remove an item from the buffer and was about to update the counter variable, producer interrupted and context switching occurred. After producer inserted one item and incremented and updated the counter variable successfully, consumer was reallocated to CPU and can resume its execution. Explain briefly with example (instructions) what may occur due to this context switching. [CO3, C4, Mark: 5]