



# United International University

Department of Computer Science and Engineering

CSI 309: Operating System Concepts

Midterm Examination

Spring 2020

Time: 1 Hour 45 Minutes

Full Marks: 30

[Answer all the questions. Figures in the right margin indicate marks.]

1. ✎ What is the main advantage for an operating system designer of using virtual machine architecture? How does the guest operating system function on the host operating system? Describe with a figure. [Hint: VMWare] 2+2
- ✎ What is a PCB? Who does maintain the PCB- Kernel or the process itself? 1+1+2  
How is PCB related to context switching?
- ✎ Draw the process state transition diagram and briefly explain it. 2
2. ✎ Differentiate between logical address and physical address. How logical addresses are mapped to physical addresses in paging system. 2+2
- ✎ Given memory partitions of 1000 KB, 500 KB, 200 KB, 300 KB and 600 KB (in order), how would each of the first-fit, best-fit, worst-fit algorithms place processes of 212 KB, 417 KB, 112 KB and 426 KB (in order)? Show which algorithm makes the most efficient use of the memory. 3
- ✎ Consider a paging system with TLB hit ratio of 70%. If the memory access time is 120 nanoseconds and the searching time for TLB is 40 nanoseconds, solve the effective memory access time? 3  
160
3. ✎ Explain Little's Theorem. Why aging is necessary to be considered in multi-level Ready Queue? 2+2



by Prepare the *Gantt Chart* and compute the average waiting time for 3x2= preemptive Shortest Job First (SJF), First Come First Serve (FCFS), Non-preemptive Priority Scheduling for the following chart in Table 1. Consider the lowest number has the highest priority and Time quantum=3.

Table 1: Process Burst Time, Arrival Time and Priority

Process	Burst Time	Arrival Time	Priority
P1	5	0	3
P2	6	2	✓
P3	11	4	4
P4	8	6	2
P5	7	7	0✓

