# CS365 Operating System Final Exam--Example

Name: _____

| Question Number | Score |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| Total: | |

*Question1:*
Circle true or false: (total 10 pts, 1pt each)

| | |
|---|---|
| T F | 1. Many operating system merge I/O devices and files into a combined file because of the similarity of system calls for each. |
| T F | 2. System calls can be run in either user mode or kernel mode. |
| T F | 3. Java's RMI is a feature similar to RPCs. |
| T F | 4. The single benefit of a thread pool is to control the number of threads. |
| T F | 5. Virtually all contemporary operating systems support kernel threads. |
| T F | 6. Race conditions are prevented by requiring that critical regions be protected by locks. |
| T F | 7. Monitors are a theoretical concept and are not practiced in modern programming languages. |
| T F | 8. If a resource-allocation graph has a cycle, the system must be in a deadlocked state. |
| T F | 9. Ordering resources and requiring the resources to be acquired in order prevents the circular wait from occurring and therefore prevents deadlock from occurring. |
| T F | 10. The banker's algorithm is useful in a system with multiple instances of each resource type. |

*Question2:*
Explain the following terminology: (total 8pts, 1pt each)

1. **Preemptive Scheduling and Non-preemptive Scheduling**

2. **LWP**

3. **Gatt Chart**

4. **Spinlock**

5. **Semaphor**

6. **Deadlock**

7. **Critical Section**

8. **CPU throughput**

*Question3:* (total 10 pts)
By "**Multilevel Queue Fixed priority**" scheduling algorithm, draw the CPU scheduling Gantt chart and complete the table for the give processes information.

| | Process | Burst time | Arriving time | Algorithm |
|---|---|---|---|---|
| ■ 1st Foreground | P1 | 50 | 0.0 | RR interval:20 |
| | P2 | 15 | 30.0 | (RR is a non-preemptive |

| | | | | |
|---|---|---|---|---|
| | P3 | 45 | 30.0 | algorithm) |
| ■ 2nd Foreground | P4 | 40 | 0.0 | SJF Preemptive |
| | P5 | 10 | 120.0 | |
| ■ Background | P6 | 30 | 60.0 | FCFS |
| | P7 | 20 | 130.0 | |

Gantt Chart:

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| Waiting time | | | | | | | |
| Turnaround time | | | | | | | |
| Response time | | | | | | | |

*Question4:* (total 9 pts)

1. Explain and describe 3 different types of process schedulers. (3pts)

2. We consider a system consisting of two processes, P0 and P1, each accessing two semaphores, S and Q, set to the value 1.

| P0 | P1 |
|---|---|
| Wait(S) | Wait(S) |
| Wait(Q) | Wait(Q) |
| … | … |
| … | … |
| … | … |

Signal(S) Signal(Q)
Signal(S) Signal(S)

What kind of unwanted **situation(s)** will happen? Explain your answer. (3pts)

3.

| | Allocation | | | | Request | | | | Available | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | A | B | C | D | A | B | C | D |
| P1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 3 | 1 |
| P2 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | | | | |
| P3 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | | | | |

1) Draw the resource-allocation graph under the above situation. (3pts)
2) Is there a cycle? (1pt)
3) Is there a deadlock? (1pt)

*Question5:*

1. A system uses a fixed-partition scheme, with equal-sized partitions of 2^16 bytes for a page, and a total main memory size of 2^24 bytes. How many bits are used for page number and how many bits are used for offset? (4 points)

| page number | offset |
|---|---|
| | |

2. A system uses a dynamic partitioning scheme, and the current memory

configuration is as shown below. (1 point each blank, total 9 points)


The shaded areas are allocated blocks. The unshaded areas are free blocks. The next three memory requests are for 40MB, 20MB, and 60MB. Indicate the starting address for each of the three blocks using the specified placement algorithm:

a) first-fit

| 40MB | 20MB | 60MB |
|---|---|---|
| | | |

*Question 6:*

1. Routers communicate using point-to-point instead of broadcast. That is, the broadcast is stopped at the gateway. Why would it be a bad idea for gateways to pass broadcast packets between networks? What would be the advantages of doing so? (2 points)