

	FINALTERM EXAMINATION FALL 2006 CS604 - OPERATING SYSTEMS	Marks: 75 Time: 120min
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StudentID/LoginID: _____

Student Name: _____

Center Name/Code: _____

Exam Date: _____

Please read the following instructions carefully before attempting any question:

1. This examination is closed book, closed notes, closed neighbors.
2. Answer all questions.
 - a. There is no choice.
 - b. You will have to answer all questions correctly in this examination to get the maximum possible marks.
3. Do not ask any questions about the contents of this examination from anyone.
 - a. If you think that there is something wrong with any of the questions, attempt it to the best of your understanding.
 - b. If you believe that some essential piece of information is missing, make an appropriate assumption and use it to solve the problem.
4. Examination also consists of multiple-choice questions. Choose only one choice as your answer.
 - a. If you believe that two (or more) of the choices are the correct ones for a particular question, choose the best one.
 - b. On the other hand, if you believe that all of the choices provided for a particular question are the wrong ones, select the one that appears to you as being the least wrong.
5. All Programming questions should be answered using C syntax. Errors of syntax will

not be considered as errors. So try to only answer the question and put your idea and

concept using C. Don't use any tool or IDE.

****WARNING: Please note that Virtual University takes serious note of unfair means. Anyone found involved in cheating will get an `F` grade in this course.**

For Teacher's use only											
Question	1	2	3	4	5	6	7	8	9	10	Total
Marks											

Question No: 1 (Marks: 2) - Please choose one

Segmented paging incurs less internal fragmentation than pure process-level paging.

- ▶ **True**
- ▶ **False**
- ▶ **Ambiguous question**

Question No: 2 (Marks: 2) - Please choose one

The Multi-Level Feedback Queue (MLFQ) scheduling algorithm is the same as Shortest-Job-First.

- ▶ **True**
- ▶ **False**
- ▶ **Ambiguous question**

Question No: 3 (Marks: 2) - Please choose one

In paging systems, external fragmentation cannot occur.

- ▶ **True**
- ▶ **False**
- ▶ **Ambiguous question**

Question No: 4 (Marks: 2) - Please choose one

Race condition cannot occur on a uniprocessor.

- ▶ **True**
- ▶ **False**
- ▶ **Ambiguous question**

Question No: 5 (Marks: 2) - Please choose one

A processor in ready state can only change to running or exit state.

- ▶ **True**
- ▶ **False**
- ▶ **Ambiguous question**

Question No: 6 (Marks: 5)

The following is a **semaphore-based solution** for the n-process critical section problem. Is it a good solution? Explain your answer.

Structure for P_i

```
semaphore mutex = 1;
```

```
do {
```

```
    wait (mutex);
```

```
    critical section
```

```
    signal (mutex);
```

```
    remainder section
```

```
} while (1);
```

Question No: 7 (Marks: 20)

This is a string of memory page references:

1, 2, 3, 4, 3, 2, 1, 5, 3, 2, 5

Draw diagrams showing the frame usage at each memory reference for each of the following page replacement algorithms. Also give the number of page faults generated by each algorithm [FIFO – first in first out, LRU – least recently used and LFU – least frequently used].

Assume the system uses pure demand paging and starts with no pages in real memory. There are three frames of real memory.

Note: Frame is the term used for a page of real memory.

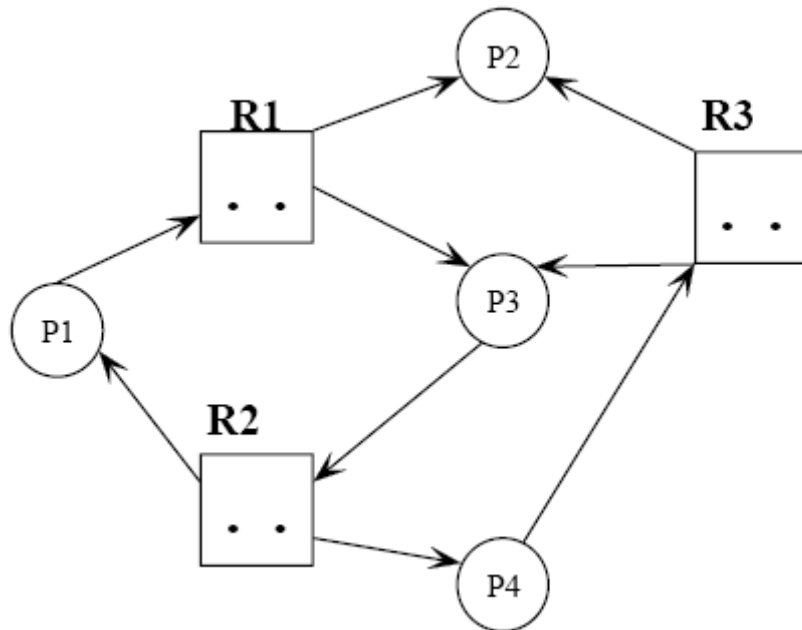
Question No: 8 (Marks: 10)

Given the following resource-allocation diagram,

(i) Draw the wait-for graph

(ii) Determine whether or not there is a deadlock.

If yes, justify clearly indicating the reason. If no, explain why there is no deadlock.



Question No: 9 (Marks: 10)

Suppose there are 2 copies of resource A, 3 copies of resource B, and 3 copies of resource C. Suppose further that process 1 holds one unit of resources B and C and is waiting for a unit of A; that process 2 is holding a unit of A and waiting on a unit of B; and that process 3 is holding one unit of A, two units of B, and one unit of C. Draw the resource allocation graph. Is the system in a deadlocked state? Why or why not?

Question No: 10 (Marks: 20)

(a) Given the following snapshot of a system, determine whether or not the system is in a safe state.

SHOW YOUR WORK justifying your answer. (Use Banker's algorithm)

Process ID	Maximum need			Current allocation			Available		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
P1	3	2	3	2	2	2	1	1	2
P2	1	3	2	0	1	2			
P3	4	4	4	0	2	2			
P4	1	6	1	1	0	1			

(b) Given the following resource-allocation state of a system at time T0, determine whether or not the system is in deadlock at T0. Justify your answer.

Process ID	New Request			Current allocation			Current Available		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
A	2	3	1	1	1	1	1	0	2
B	0	2	2	0	2	0			
C	3	4	4	4	2	4			
D	1	0	1	1	2	1			