EASTERN UNIVERSITY, SRI LANKA

SECOND EXAMINATION IN SCIENCE 2002/2003 (Repeat)

FIRST SEMESTER (June/July, 2003)

CS 202 Operating Systems

Answer all questions

Time allowed: 2 Hours

Q1 Answer all parts

(a) State clearly the main functions of a modern operating system.

(b) Describe what multiprogramming is and explain why it is needed

(c) State clearly what is meant by spooling and describe the use of it.

(d) State clearly what is meant by batch system, and explain how it works.

(e) Distinguish between the operating systems of microcomputers and mainframe computers

Q2 Answer all parts

(a) State clearly what race condition is, and give an example of it. Explain clearly how race condition would be avoided.

(b) Five batch jobs A through E, arrive at a computer center almost at the same time. Their estimated running times are 8, 4, 2, 5 and 7 minutes. Their (externally determined) priorities are 3, 5, 2, 1 and 4, respectively, with 5 being the highest priority. For each of the following scheduling algorithms, determine the mean process turnaround time. Ignore process-switching overhead.

(i) Round robin.

(ii) Priority scheduling.

(iii) First-come, first served (run in order 8, 4, 2, 5, 7).

(iv) Shortest job first.

For (i), assume that the system is multiprogrammed, and that each job gets its fair share of the CPU (the time quantum 2 minutes). For (ii) to (iv) assume that only one job runs at a time, until it finishes. All jobs are completely CPU bound.

Q3 Answer all parts

(A) Describe Static memory allocation and Dynamic memory allocation.

What is the difference between a **Virtual address** and a **Physical address** in a virtua memory system.

(B) Describe the following memory allocation algorithms:

(i) First-fit
(ii) Best-fit
(iii) Worst-fit
(iv) Next-fit

Consider a swapping system in which memory consists of the following hole sizes memory order: 10K, 4K, 20K, 18K, 7K, 9K, 12K, and 15K. Which hole is taken fo successive segment requests of

(a) 12K
(b) 10K
(c) 9K,

for the above allocation algorithms.

Q4 Answer all parts

(A) Describe the deadlock detection algorithm using Resource Graph.

Consider the system:

1. Process A holds R and wants S.
2. Process B holds nothing but wants T.
3. Process C holds nothing but wants S.
4. Process D holds U and wants S and T.
5. Process E holds T and wants V.
6. Process F holds W and wants S.
7. Process G holds V and wants U.

Draw the resource graph for the above system.

Examine this system for deadlock situation and if it is deadlocked, which processes ar involved?

(B) Explain the **Banker's** algorithm of deadlock avoidance.

A system has five processes P0, P1, P2, P3 and P4 and four allocatable resources R0, R2, and R3. The current allocation and maximum needs are as follows:

This question continues

Continuation.....

	Allocated			
	R0	R1	R2	R3
P0	2	0	1	1
P1	0	1	2	1
P2	4	0	0	3
P3	0	2	1	0
P4	1	0	3	0

Maximum Needs			
R0	R1	R2	R3
3	2	1	4
0	2	5	2
5	1	0	5
1	5	3	0
3	0	3	5

Available

R0	R1	R2	R3
8	5	9	7

Investigate the state of the system for deadlock situation using Banker's algorithm.