EASTERN UNIVERSITY SRI LANKA
DEPARTMENT OF MATHEMATICS
SECOND EXAMINATION IN SCIENCE – 2009/2010
FIRST SEMESTER (June /July 2011)

CS 202 – OPERATING SYSTEMS

(Proper and Repeat)

Answer all questions | Time: 2 Hours

1. a. What is memory fragmentation?
   b. Compare the internal and external fragmentation giving an example scenario fo each.
   c. Explain the first fit and best fit memory allocation techniques.
   d. A computer operates with 128 MB primary memory. A portion of 30MB is used fo the default operating system files and it will not be used by the user programs as shown in the figure 1.1. The table next to the figure shows a list of Jobs that are to be loaded into the memory. Assume the computer operating system uses the dynamic partitioning scheme for memory allocation.

Figure 1.1

Job no	Memory requested (MB)	Arrival time (Sec)	CPU Burst (Sec)
J1	10	0	10
J2	15	0	30
J3	20	0	20
J4	50	0	10
J5	5	10	30
J6	30	10	40
J7	10	20	20
J8	30	20	40

   i. What is meant by dynamic partitioning scheme for memory allocation.
   ii. Show the memory allocation and memory fragmentation in the above diagram at the end of 0^{th}, 11^{th} and 21^{st} seconds.
   iii. What is the total memory fragmentation at the 21^{st} second?

2. a. Discuss the operating systems responsibility when a process termination take place.
   b. Draw the process state transition diagram and explain each state.
   c. What do you understand by Co-operative and Independent process?
   d. List three advantages of Co-operative process.
   e. Discuss the problems with concurrent execution of processes.
   f. Describe the Critical Section problem of process synchronization.
   g. Suggest a solution to the Dining Philosophers problem using semaphores.

3. a. Define the terms 'Job scheduling' and 'CPU scheduling'.
   b. Define the two interrupting policies that can be imposed on scheduling.
   c. Describe the Priority scheduling algorithm.
   d. What do you understand by 'Starvation' and 'Aging' in the context of priority process scheduling?
   e. Given the following information about six processes:

Process	CPU Burst	Priority	Arrival time
A	10	4	0
B	3	2	2
C	5	3	7
D	2	1	8
E	4	2	13
F	6	3	14

If the above processes are scheduled using the Preemptive Priority sche algorithm,

i. Draw the Gantt chart to represent the scheduling.
ii. Calculate the average waiting time and average turnaround time.

4. a. What is meant by a deadlock? Give an example scenario for a deadlock.

b. How do you confirm that a system is in deadlocked state?

c. How can you prevent the system from a dead lock?

d. Consider the snapshot of system operation described below:

The system has seven processes namely, P1, P2, P3, P4, P5, P6 & P7 and six resources namely R, S, T, U, V & W.

- Process P1 holds R and wants S.
- Process P2 holds nothing but wants T.
- Process P3 holds nothing but wants S.
- Process P4 holds U and wants S and T.
- Process P5 holds T and wants V.
- Process P6 holds W and wants S.
- Process P7 holds V and wants U.

i. Draw the resource allocation graph for the above system.

ii. Draw the Wait-for graph for the above system.

iii. Examine the system for deadlock situation and if the system is deadlocked, list processes involved in deadlock.