EASTERN UNIVERSITY, SRI LANKA

SECOND EXAMINATION IN SCIENCE– 2010/2011

SECOND SEMESTER (... APRIL, 2013)

CS 202 – OPERATING SYSTEMS

(Proper and Repeat)

Answer all questions | Time allowed: 2 hours

Q1

a) State clearly what an operating system is and briefly describe the functions of an operating system.

b) Explain the responsibility of the operating systems when a process is created and terminated.

c) State the advantages of a spooling system over a batch processing system.

d) Describe briefly the process interrupting policies and explain those with the aid of suitable examples.

e) A *semaphore* is a process synchronisation tool.

(i) Describe how semaphores work with P(s) and V(s) operations on semaphore 's'.

(ii) Describe briefly the Producer Consumer problem with regard to process synchronization.

(iii) Explain briefly how the semaphores could be used to solve the Producer Consumer problem.

Q2

a) Describe briefly the Context switching and discuss the overheads involved in context switching of processes.

b) Explain the First Come- First Served scheduling giving its advantages and disadvantages.

c) Consider the following set of processes, with the arrival times and the length of the CPU-burst times given in milliseconds.

Process	Burst time (ms)	Priority	Arrival time
P1	50	4	0
P2	20	1	20
P3	100	3	40
P4	40	2	60

(i) Draw the Gantt chart for each of the following scheduling algorithms

(α) First Come First Serve (FCFS)

(β) Priority Scheduling (pre emptive)

(ii) Calculate the waiting time and the turnaround time for each process using each of those scheduling algorithms in part (i). Also compute the average waiting time and the average turnaround time for each of those algorithms.

(iii) Identify the scheduling algorithm from part (i) that result in the minimal average waiting time.

Q3

a) What are the four conditions required for deadlock to occur?

b) What are the differences between deadlock avoidance and deadlock prevention?

c) What are the differences between an unsafe state and a deadlock state?

d) Consider the snapshot of system operation described below:

The system has four processes namely, P0, P1, P2 & P3 and three resource types namely A, B & C.

Process	Allocation	Max	Need
	A B C	A B C	A B C
P0	0 0 1	0 0 1	
P1	1 0 0	1 7 5	
P2	1 3 5	2 3 5	
P3	0 6 3	0 6 5	
Total	**2 9 9**		

Available
A B C
1 5 2

(i) How many resource instances are there of type (A,B,C) in the system?

(ii) What is the content of the Need matrix (Need column in the above table)?

(iii) Use the Bankers Algorithm to find whether the system in a safe state or not. If the system is safe, give the safe sequence in which the processes could execute without causing a deadlock to the system.

(iv) If a request from process P1 arrives for additional resources of (0,5,2), can the Banker's algorithm grant the request immediately? If yes what is the safe sequence?

Q4

a. Explain the following memory partitioning schemes:

(i) Fixed partitioning.

(ii) Dynamic partitioning.

b. Explain the following memory allocation methods:

(iii)First-fit allocation.

(iv)Best-fit allocation.

c. State clearly what the deallocation of memory is. Describe how it is handled by an operating system for the partitioning schemes in part (a).

d. What do you understand by "memory fragmentation"?

e. Discuss the problem of memory fragmentation with regard to paged memory allocation schemes.

f. Explain briefly the demand paging.