EASTERN UNIVERSITY, SRI LANKA

DEPARTMENT OF MATHEMATICS

SECOND YEAR FIRST SEMESTER (NOV. / DEC., 2016) - 2013/2014

CS 202 – OPERATING SYSTEMS

REPEAT

all questions **Time allowed: 2 Hours**

An operating system is a program that manages a computer's hardware.

Describe the differences between **symmetric** and **asymmetric** multiprocessing. How do **clustered systems** differ from **multiprocessor systems**?

Briefly explain three system components with their major activities.

What is the purpose of system calls? Explain the types of system calls.

What are the differences between **threads** and **process**?

Describe the differences among **Many-to-One**, **One-to-One** and **Many-to-Many** multi threading models.

Processes can execute concurrently or in parallel. Concurrent access to shared data may result in data inconsistency.

What do you understand by **semaphore**? Briefly explain the type of semaphores.

Explain the **Producer Consumer Problem** of process synchronization and how semaphores could be used to solve the problem.

Compare the scheduling algorithms **Round Robin scheduling** and **priority scheduling**.

Consider the following set of processes, with the length of the CPU burst given in milliseconds:

Process	Burst Time	Arrival Time	Priority
P1	25	0	40
P2	20	20	30
P3	25	30	30
P4	15	60	35
P5	5	70	5
P6	10	75	10

I. Draw the Gantt charts that illustrate the execution of these processes using following scheduling algorithms:

   a. Round Robin (using a time quantum of 10 milliseconds);

   b. Preemptive Priority Scheduling.

II. What is the turnaround time and waiting time of each process for each of scheduling algorithms in part I? Calculate the average turnaround time and 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. Deadlocks are a set of blocked processes each holding a resource and waiting to acquire resource held by another process.

1. How do you confirm that a system is in deadlock state?
2. How can you recover a system from deadlock state?
3. Consider the following snapshot of a system:

   The system has five processes namely, P0, P1, P2, P3, & P4 and the resources namely A, B, C, & D.

Process	Allocation	Max	Available
	A B C D	A B C D	A B C D
P0	2 0 0 1	4 2 1 2	3 3 2 1
P1	3 1 2 1	5 2 5 2	
P2	2 1 0 3	2 3 1 6	
P3	1 3 1 2	1 4 2 4	
P4	1 4 3 2	3 6 6 5	

Answer the following questions using the **Banker's** algorithm:

a) What is the content of Need Matrix?

b) Illustrate that the system is in a safe state by demonstrating an order in which processes may complete.

c) If a request from process P1 arrives for (1, 1, 0, 0), can the request be granted immediately? If yes give the safe sequence.

d) If a request from process P4 arrives for (0, 0, 2, 0), can the request be granted immediately? If yes give the safe sequence.

Memory management keeps track of each and every memory location either it is allocated to some process or it is free.

Discuss the **Static** and **Dynamic** memory partitioning schemes.

Briefly explain the **paged memory management scheme** with the aid of a diagram.

I. What do you understand by **memory fragmentation**?

II. Explain the difference between **internal** and **external** fragmentation.

The following table shows the job details and the list of memory blocks of the system:

Job List	
Job No	**Memory Requested**
J1	100
J2	10
J3	35
J4	15
J5	23
J6	25

Memory List	
Memory Block	**Block Size**
Block 1	50
Block 2	100
Block 3	70
Block 4	115
Block 5	15

I. Jobs are loaded into memory using fixed partition. Use the first-fit, best-fit and worst-fit memory allocation policies to allocate the memory blocks to the jobs given and calculate the memory fragmentation in each case.

II. Which is the most efficient allocation policy for the particular problem given above? Justify your answer.