

(each 7.5 pt)

6. What is meant by the term *context switch*? What might cause a context switch to occur?

7. Consider the following sets of processes, with the length of the CPU-burst time given in milliseconds. Arrival time is the time at which the process is added to the ready queue.

Process	Burst Time	Arrival Time
P1	10	0
P2	5	0
P3	3	0
P4	4	0
P5	2	4
P6	1	6

a Draw appropriate charts illustrating the execution of these processes using FCFS, SJF non-preemptive, and SJF preemptive.

b Calculate the wait times of each process for each strategy. Calculate the average wait times under each strategy.

Process	FCFS	SJF-nonpre	SJF
P1			
P2			
P3			
P4			
P5			
P6			
Average			

8. What is starvation, give an example?

ducer threads to pass data to consumer threads), but that the buffer is unbounded; in other words, it does not have a limit as to how big it can get.

a How many condition variables will you need in order to implement this buffer properly, and why?

b How is this different than a standard bounded buffer implementation?

10. Describe four ways to *prevent* deadlock by attacking the conditions required for deadlock.

11. Why does the operating system need to provide mechanisms to facilitate process cooperation?

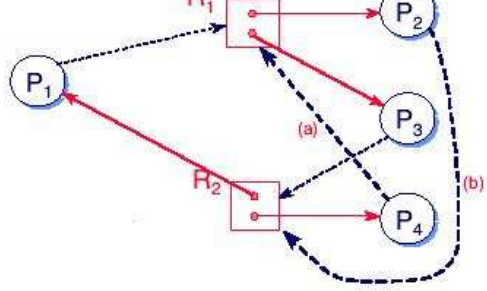


Figure 1: Figure

Part C.

12. The state of the system is with four processes and two multiple units resources described in resource allocation graph (see the Figure). Explain the cases that deadlock occurs and does not occur. (10 pts)

- There is only “(a)” request.

- There are both “(a)” and “(b)” requests.

13. **The Sleeping-Barber Problem.** A barbershop consists of a waiting room with n chairs and the barber room containing the barber chair. If there are no customers to be served, the barber goes to sleep. If a customer enters the barbershop and all chairs are occupied, then the customer leaves the shop. If the barber is busy but chairs are available, then the customer sits in one of the free chairs. If the barber is asleep, the customer wakes up the barber. Write pseudo code to coordinate the barber and the customers.

Hints: Need a global counter for the number of customers that are currently waiting in a chair. Use 3 semaphores - one for the customers (barber waits till a customer signals they are ready), one for the barber (customer waits tile barber signals he is ready) and one for the critical section (where the global counter is modified). (20 pts)