1A. Draw the diagram of shared memory communication model for cooperating processes. Declare a shared data as an array of structures and illustrate with appropriate code how two processes will cooperate each other to share this memory.

1B. List the properties of the communication link with Direct and indirect process communication.

2A. In a system, processes P1, P2 and P3 share a mailbox *A* for interprocess communication. Here process P1 is a sender and processes P2 and P3 execute receive () system calls. Now which process will receive the message sent from P1? Discuss.

2B. Differentiate multilevel queue and multilevel feedback queue scheduling algorithms subjected to their principles.

3. For the following scenario, draw Gantt charts for pre-emptive SJF, preemptive priority and RR scheduling with time quantum of 4ms . The context switching time is given to be 1ms and assume lower the priority value, higher is the process priority. Calculate waiting time and turnaround time for each process and also average waiting time and average turnaround time. Show your complete calculation.

|  |  |  |  |
| --- | --- | --- | --- |
| Process | Burst Time in ms | Arrival time in ms | Process priority |
| P0 | 10 | 0 | 5 |
| P1 | 6 | 1 | 4 |
| P2 | 2 | 3 | 2 |
| P3 | 4 | 5 | 0 |

4A. Clearly differentiate safe state, unsafe state and deadlock state in a system with appropriate example.

4B. Define a resource allocation graph with appropriate example and using this graph, explain resource allocation graph algorithm.

5A. Explain the method with which prediction of the length of the next-CPU-burst is done. It is given with α = 0.5, what would be the next expected burst time for a process with burst time of 5ms. Initial burst time is assumed to be 10ms.

5B. What are the necessary conditions for deadlocks to occur? Explain various protocols to prevent deadlocks i) by ensuring that the Hold and Wait conditions never occur ii)by ensuring that circular wait condition never holds.