

Q1.

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

<u>Process</u>	<u>Burst Time</u>	<u>Priority</u>
P_1	2	2
P_2	1	1
P_3	8	4
P_4	4	2
P_5	5	3

The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4, P_5 , all at time 0.

- Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, SJF, non-preemptive priority (a larger priority number implies a higher priority), and RR (quantum = 2).
- What is the turnaround time of each process for each of the scheduling algorithms in part a?
- What is the waiting time of each process for each of these scheduling algorithms?
- Which of the algorithms results in the minimum average waiting time (over all processes)?

Q2.

The following processes are being scheduled using a preemptive, round-robin scheduling algorithm.

<u>Process</u>	<u>Priority</u>	<u>Burst</u>	<u>Arrival</u>
P_1	40	20	0
P_2	30	25	25
P_3	30	25	30
P_4	35	15	60
P_5	5	10	100
P_6	10	10	105

Each process is assigned a numerical priority, with a higher number indicating a higher relative priority. In addition to the processes listed below, the system also has an **idle task** (which consumes no CPU resources and is identified as P_{idle}). This task has priority 0 and is scheduled whenever the system has no other available processes to run. The length of a time quantum is 10 units. If a process is preempted by a higher-priority process, the preempted process is placed at the end of the queue.

- Show the scheduling order of the processes using a Gantt chart.
- What is the turnaround time for each process?
- What is the waiting time for each process?
- What is the CPU utilization rate?

Q3.

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

<u>Process</u>	<u>Burst Time</u>	<u>Priority</u>
P_1	5	4
P_2	3	1
P_3	1	2
P_4	7	2
P_5	4	3

The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4, P_5 , all at time 0.

- Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, SJF, non-preemptive priority (a larger priority number implies a higher priority), and RR (quantum = 2).
- What is the turnaround time of each process for each of the scheduling algorithms in part a?
- What is the waiting time of each process for each of these scheduling algorithms?
- Which of the algorithms results in the minimum average waiting time (over all processes)?

Q4.

The following processes are being scheduled using a preemptive, priority-based, round-robin scheduling algorithm.

<u>Process</u>	<u>Priority</u>	<u>Burst</u>	<u>Arrival</u>
P_1	8	15	0
P_2	3	20	0
P_3	4	20	20
P_4	4	20	25
P_5	5	5	45
P_6	5	15	55

Each process is assigned a numerical priority, with a higher number indicating a higher relative priority. The scheduler will execute the highest-priority process. For processes with the same priority, a round-robin scheduler will be used with a time quantum of 10 units. If a process is preempted by a higher-priority process, the preempted process is placed at the end of the queue.

- Show the scheduling order of the processes using a Gantt chart.
- What is the turnaround time for each process?
- What is the waiting time for each process?