

# Assignment # 4

## Task # 1

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)?

## Task # 2

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?

### Task # 3

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)?

#### Task # 4

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?