

COMP 2004
Assignment 4 – CPU Scheduler

1. (60%) Consider the following set of processes, with the length of the CPU burst given in milliseconds:

Process	Burst time	Priority
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 P1, P2, P3, P4, P5, all at time 0.

- a. (30%) 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, no priority).
 - b. (12%) What is the turnaround time of each process for each of the scheduling algorithms in part a?
 - c. (12%) What is the waiting time of each process for each of these scheduling algorithms?
 - d. (6%) Which of the algorithms results in the minimum average waiting time (overall processes)?
2. (40%) The following processes are being scheduled using a pre-emptive, priority-based, round-robin scheduling algorithm.

Process	Time	Priority	Burst	Arrival
P ₁		8	15	0
P ₂		3	20	0
P ₃		4	20	20
P ₄		4	20	20
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 pre-empted by a higher-priority process, the pre-empted process is placed at the end of the queue.

- a. (20%) Show the scheduling order of the processes using a Gantt chart.
- b. (10%) What is the turnaround time for each process?
- c. (10%) What is the waiting time for each process?