# **Fall 2022**

# **CSE 321 Operating Systems**

# **Lab Assignment 4**

**Total Marks: 30**

Given the list of processes, their CPU burst times, arrival times and priorities, implement **SJF, Priority and Round Robin** scheduling algorithms with **preemption**. For each of the scheduling policies, compute and print the Completion Time(CT), Turnaround Time (TAT), and Waiting Time (WT) for each process using **C Programming.**

**Waiting time:** Processes need to wait in the process queue before execution starts and in execution while they get preempted.

**Turnaround time:** Time elapsed by each process to get completely served. (Difference between submission time and completion time).

**Task 1:** **SJF Scheduling with preemption**

**You can use the following input as sample:**

| **Process** | **Arrival Time** | **Burst Time** |
| --- | --- | --- |
| P1 | 0 | 5 |
| P2 | 2 | 2 |
| P3 | 3 | 7 |
| P4 | 4 | 4 |
| P5 | 5 | 5 |

**Solution in a Gantt chart:**

| **P1** | **P2** | **P2** | **P1** | **P4** | **P5** | **P3** |
| --- | --- | --- | --- | --- | --- | --- |

**0 2 3 4 7 11 16 23**

**Sample Output Structure:**

| **Grant Chart: P1 P5 P2 P1 P5 P2 P1 P5 P2 P1 P3 P4 P3 P4**  **Proc AT BT CT WT TAT**  **P1 3 8 22 11 19**  **P5 4 5 18 9 14**  **P2 5 6 20 9 15**  **P3 18 3 27 6 9**  **P4 20 3 28 5 8**  **Average waiting time: 8.0**  **Average turnaround time: 13.0** |
| --- |

**\*\***Output values are random and do not match the given input.

**Task 2:** **Round Robin**

**You can use the following input as sample:**

Time Quantum = 20 ms

| **Process** | **Burst Time** |
| --- | --- |
| P1 | 53 |
| P2 | 17 |
| P3 | 68 |
| P4 | 24 |

**Solution in a Gantt chart:**

| **P1** | **P2** | **P3** | **P4** | **P1** | **P3** | **P4** | **P1** | **P3** | **P3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

**0 20 37 57 77 97 117 121 134 154 162**

**Sample Output Structure:**

| **Grant Chart: P1 P5 P2 P1 P5 P2 P1 P5 P2 P1 P3 P4 P3 P4**  **Proc AT BT CT WT TAT**  **P1 3 8 22 11 19**  **P5 4 5 18 9 14**  **P2 5 6 20 9 15**  **P3 18 3 27 6 9**  **P4 20 3 28 5 8**  **Average waiting time: 8.0**  **Average turnaround time: 13.0** |
| --- |

**\*\***Output values are random and do not match the given input.

**Task 3: Priority Scheduling**

**You can use the following input as sample (smallest integer = highest priority):**

| **Process** | **Arrival Time** | **Burst Time** | **Priority** |
| --- | --- | --- | --- |
| P1 | 0 | 15 | 2 |
| P2 | 14 | 5 | 4 |
| P3 | 3 | 10 | 0 |
| P4 | 9 | 22 | 3 |
| P5 | 7 | 16 | 1 |

**Solution in a Gantt chart:**

| **P1** | **P3** | **P5** | **P1** | **P4** | **P2** |
| --- | --- | --- | --- | --- | --- |

**0 3 13 29 41 63 68**

**Sample Output Structure:**

| **Grant Chart: P1 P5 P2 P1 P5 P2 P1 P5 P2 P1 P3 P4 P3 P4**  **Proc AT BT CT WT TAT**  **P1 3 8 22 11 19**  **P5 4 5 18 9 14**  **P2 5 6 20 9 15**  **P3 18 3 27 6 9**  **P4 20 3 28 5 8**  **Average waiting time: 8.0**  **Average turnaround time: 13.0** |
| --- |

**\*\***Output values are random and do not match the given input.