LAB- 2 CPU SCHEDULING PART - 2

Priority Scheduling (Non-Preemptive) - Example Calculation

Given Data:

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	4
P4	1	5
P5	5	2

Step 1: Sort by Priority

(Smaller number = Higher priority)

Process	Burst Time	Priority
P2	1	1
P5	5	2
P1	10	3
P3	2	4
P4	1	5

Step 2: Calculate Completion Time (CT)

Process	Burst Time	Priority	Completion Time
P2	1	1	1
P5	5	2	1 + 5 = 6
P1	10	3	6 + 10 = 16
P3	2	4	16 + 2 = 18
P4	1	5	18 + 1 = 19

Step 3: Calculate Turnaround Time (TAT)

TAT=CompletionTime−ArrivalTimeTAT = Completion Time - Arrival Time

(Since no arrival times are given, assume all arrive at **time 0**.)

Process	Completion Time	Arrival Time	Turnaround Time
P2	1	0	1 - 0 = **1**
P5	6	0	6 - 0 = **6**
P1	16	0	16 - 0 = **16**
P3	18	0	18 - 0 = **18**
P4	19	0	19 - 0 = **19**

Step 4: Calculate Waiting Time (WT)

WT=TurnaroundTime−BurstTimeWT = Turnaround Time - Burst Time

Process	Turnaround Time	Burst Time	Waiting Time
P2	1	1	1 - 1 = **0**
P5	6	5	6 - 5 = **1**
P1	16	10	16 - 10 = **6**
P3	18	2	18 - 2 = **16**
P4	19	1	19 - 1 = **18**

Step 5: Compute Averages

- **Average Waiting Time** = (0 + 1 + 6 + 16 + 18) / 5 = **8.2**
- **Average Turnaround Time** = (1 + 6 + 16 + 18 + 19) / 5 = **12**

Final Output:

```
Process 2: Waiting Time: 0    Turnaround Time: 1
Process 5: Waiting Time: 1    Turnaround Time: 6
Process 1: Waiting Time: 6    Turnaround Time: 16
Process 3: Waiting Time: 16   Turnaround Time: 18
Process 4: Waiting Time: 18   Turnaround Time: 19
Average Waiting Time: 8.2
Average Turnaround Time: 12
```

Round Robin Scheduling Example (Time Quantum = 4)

Given Data:

Process	Arrival Time	Burst Time
P1	0	8
P2	1	4

Process	Arrival Time	Burst Time
P3	2	9
P4	3	5

Step 1: Gantt Chart Simulation

- **Time Quantum = 4** (Each process runs for max 4 units before switching)

Time	Process	Remaining Burst Time
0-4	P1	4
4-8	P2	0 (Completed)
8-12	P3	5
12-16	P4	1
16-20	P1	0 (Completed)
20-24	P3	1
24-25	P4	0 (Completed)
25-26	P3	0 (Completed)

Step 2: Calculate Completion Time (CT)

Process	Completion Time
P1	20
P2	8
P3	26
P4	25

Step 3: Calculate Turnaround Time (TAT)

Formula:

TAT=CompletionTime−ArrivalTimeTAT = Completion Time - Arrival TimeTAT=CompletionTime−ArrivalTime

Process	Completion Time	Arrival Time	Turnaround Time
P1	20	0	20 - 0 = **20**
P2	8	1	8 - 1 = **7**
P3	26	2	26 - 2 = **24**
P4	25	3	25 - 3 = **22**

Step 4: Calculate Waiting Time (WT)

Formula:

WT=TurnaroundTime−BurstTimeWT = Turnaround Time - Burst

Process	Turnaround Time	Burst Time	Waiting Time
P1	20	8	20 - 8 = **12**
P2	7	4	7 - 4 = **3**
P3	24	9	24 - 9 = **15**
P4	22	5	22 - 5 = **17**

Step 5: Compute Averages

- **Average Waiting Time** = (12 + 3 + 15 + 17) / 4 = **11.75**
- **Average Turnaround Time** = (20 + 7 + 24 + 22) / 4 = **18.25**

Steps to solve this problem

1. **Initialize a queue with processes sorted by arrival time** and process them in cyclic order using a fixed time quantum.
2. **Execute each process for the time quantum or remaining burst time**, then push it back to the queue if it's not completed.
3. **Track completion time, waiting time, and turnaround time** while updating the remaining burst times dynamically.
4. **Calculate waiting time (WT = TAT - Burst) and turnaround time (TAT = CT - Arrival)**, then compute averages.