

**MES Wadia College of Engineering Pune-01****Department of Computer Engineering**

<b>Name of Student:</b>	<b>Class:</b>
<b>Semester/Year:</b>	<b>Roll No:</b>
<b>Date of Performance:</b>	<b>Date of Submission:</b>
<b>Examined By:</b>	<b>Experiment No: Part B-05</b>

**PART: C ASSIGNMENT NO: 5**

**AIM:** Write a program to simulate CPU Scheduling Algorithms: FCFS, SJF (Preemptive), Priority (Non-Preemptive) and Round Robin (Preemptive).

**OBJECTIVES:**

- To study the basics of scheduling algorithms and learn concept of Preemptive and Non-Preemptive scheduling.
- To understand aggregation functions.

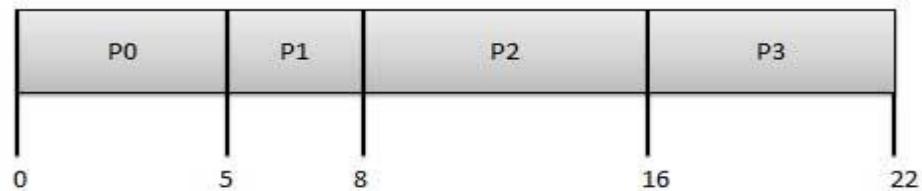
**PRE-REQUISITES:**

1. Java basics.
2. Basics of Operating System.

**APPARATUS:****THEORY:****A. First Come First Serve**

- Jobs are executed on first come, first serve basis.
- It is a non-preemptive, pre-emptive scheduling algorithm.
- Easy to understand and implement.
- Its implementation is based on FIFO queue.

Process	Arrival Time	Execute Time	Service Time
P0	0	5	0
P1	1	3	5
P2	2	8	8
P3	3	6	16



Wait time of each process is as follows –

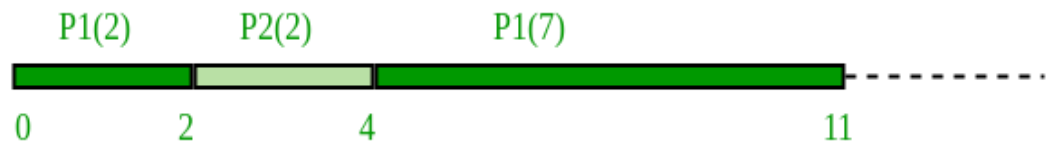
Process	Wait Time : Service Time - Arrival Time
P0	0 - 0 = 0
P1	5 - 1 = 4
P2	8 - 2 = 6
P3	16 - 3 = 13

Average Wait Time:  $(0+4+6+13) / 4 = 5.75$

### B. Shortest Job First (Preemptive)

- In this scheduling algorithm, the process with the smallest amount of time remaining until completion is selected to execute. Since the currently executing process is the one with the shortest amount of time remaining by definition, and since that time should only reduce as execution progresses, processes will always run until they complete or a new process is added that requires a smaller amount of time.

PROCESS	DURATION	ORDER	ARRIVAL TIME
P1	9	1	0
P2	2	2	2



**P1 waiting time:  $4 - 2 = 2$**

**P2 waiting time: 0**

**The average waiting time (AWT):  $(0 + 2) / 2 = 1$**

### C. Priority (Non-Preemptive)

- Priority scheduling is a non-preemptive algorithm and one of the most common scheduling algorithms in batch systems. Each process is assigned a priority. Process with the highest priority is to be executed first and so on. Processes with the same priority are executed on first come first served basis. Priority can be decided based on memory requirements, time requirements or any other resource requirement.

Process	Burst Time	Priority
P1	10	2
P2	5	0
P3	8	1

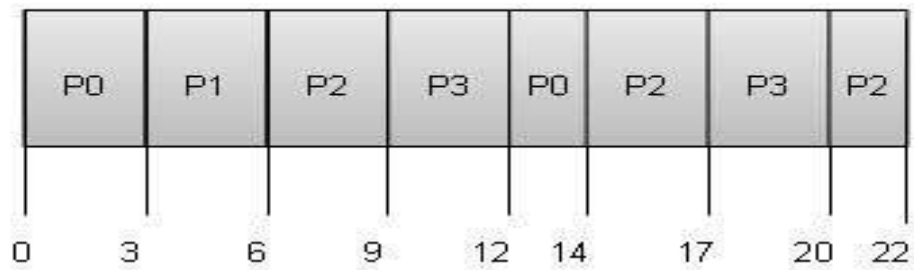
P1	P2	P3
0	10	18

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### D. Round Robin (Preemptive)

- Round Robin is the preemptive process scheduling algorithm.
- Each process is provided a fix time to execute, it is called a quantum.
- Once a process is executed for a given time period, it is preempted and other process executes for a given time period.
- Context switching is used to save states of preempted processes.

Quantum = 3



Wait time of each process is as follows –

Process	Wait Time : Service Time - Arrival Time
P0	$(0 - 0) + (12 - 3) = 9$
P1	$(3 - 1) = 2$
P2	$(6 - 2) + (14 - 9) + (20 - 17) = 12$
P3	$(9 - 3) + (17 - 12) = 11$

Average Wait Time:  $(9+2+12+11) / 4 = 8.5$ **CONCLUSION:****QUESTIONS:**

1. What is scheduling?
2. Explain Preemptive and Non- Preemptive scheduling.
3. Define CPU Utilization, Throughput, Response time, Turnaround time, Waiting Time, Fairness.