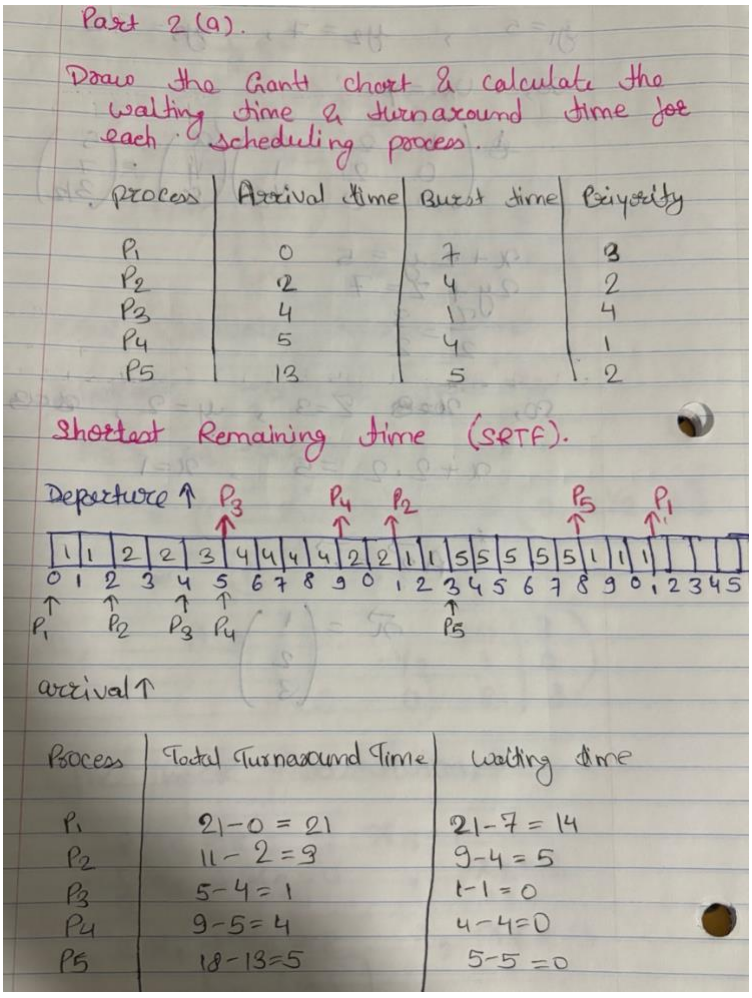
Assignment 5 Part 2

Problem 1: Assume that a system has the following processes. Draw the Gantt chart and calculate the waiting and turnaround times for each of the following scheduling policies (show process arrivals and departers on the Gantt charts)

a. Shortest Remaining Time First (SRTF).

- This algorithm follows a preemptive approach, meaning it can interrupt a running process if needed.
- At any given moment, the process with the shortest remaining burst time is prioritized for execution. If a new process arrives with a smaller burst time than the currently active one, the ongoing process will be paused, allowing the new process to run.
- When two processes have the same remaining burst time, the one that arrived first will be given precedence.



Part 2 (a).

Draw the Gantt chart & calculate the waiting time & turnaround time for each scheduling process.

Process	Arrival time	Burst time	Priority
P_1	0	7	3
P_2	2	4	2
P_3	4	1	4
P_4	5	4	1
P_5	13	5	2

Shortest Remaining time (SRTF).

Departure ↑ P_3 P_4 P_2 P_5 P_1

1 1 2 2 3 4 4 4 4 2 2 1 1 5 5 5 5 5 1 1 1

0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5

P_1 P_2 P_3 P_4 P_5

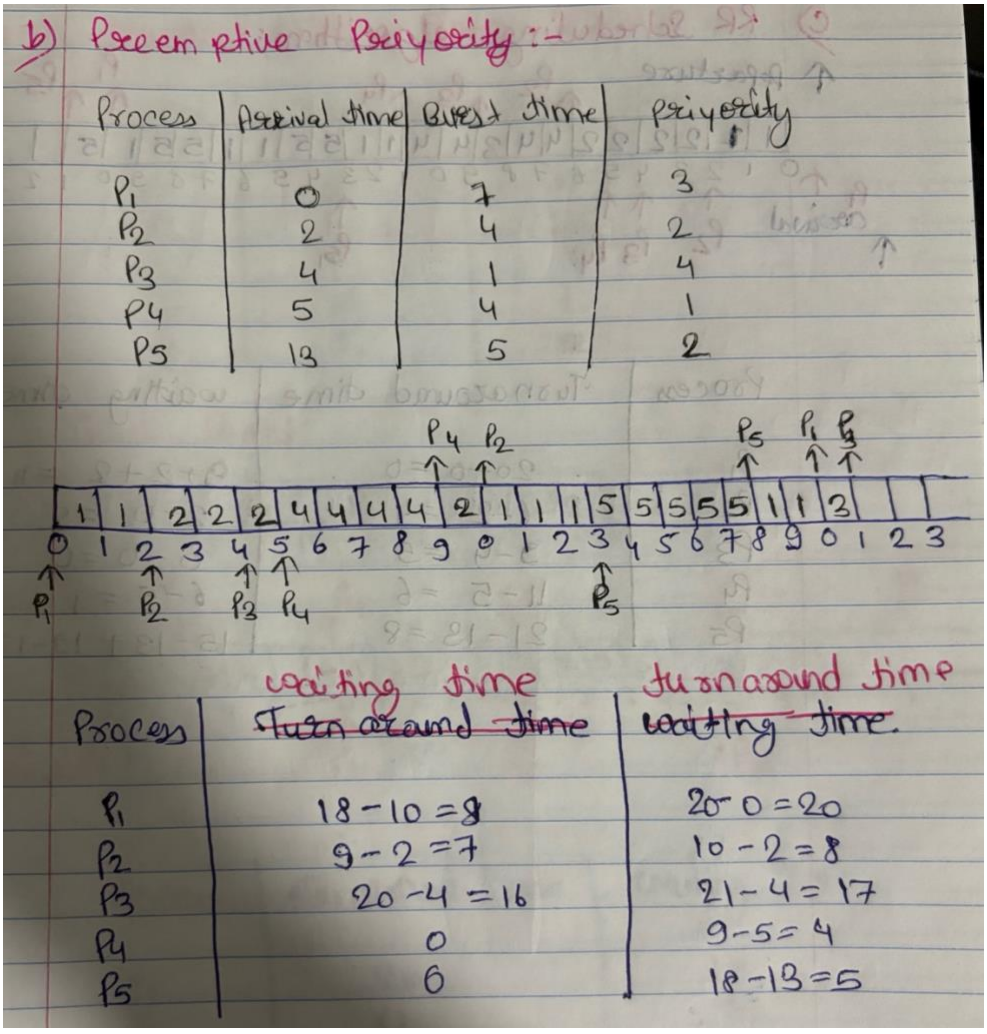
arrival ↑

Process	Total Turnaround Time	Waiting time
P_1	21-0 = 21	21-7 = 14
P_2	11-2=9	9-4 = 5
P_3	5-4=1	1-1 = 0
P_4	9-5=4	4-4=0
P_5	18-13=5	5-5 =0

So, the Arrival waiting time = 3.8 and average turnaround time= 8.

b) Preemptive Priority (smaller number indicates higher priority).

- This algorithm prioritizes processes based on their assigned priority levels.
- The process with the highest priority (indicated by the smallest numerical value) is executed first.
- If a new process with a higher priority (a lower numerical value) arrives while another process is running, the current process will be interrupted, and the new one will start executing immediately.

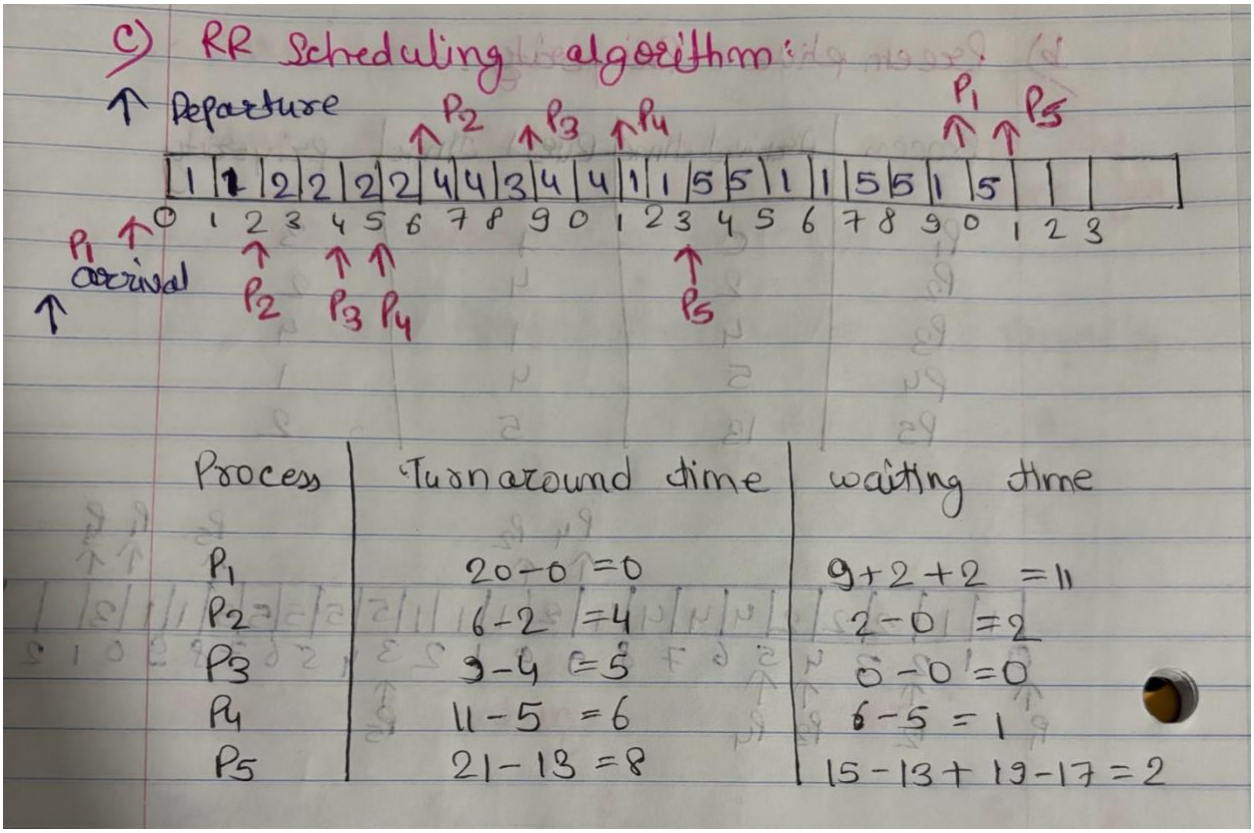


Here, **Average Times:**

- **Average Waiting Time = 6.2 units**.
- **Average Turnaround Time= 10.8 units**.

c) RR scheduling algorithm with a quantum of 2.

- In Round Robin scheduling, each process is assigned a time quantum of 2 units.
- If a process doesn't complete within this allocated time, it is pushed to the end of the queue, allowing the next process to run.
- If a new process arrives right when the current one's quantum ends, the new process is given priority over the existing one in the queue.
- This algorithm ensures that all processes get a fair chance to execute by rotating through them in a cyclic manner, preventing any single process from monopolizing the CPU.



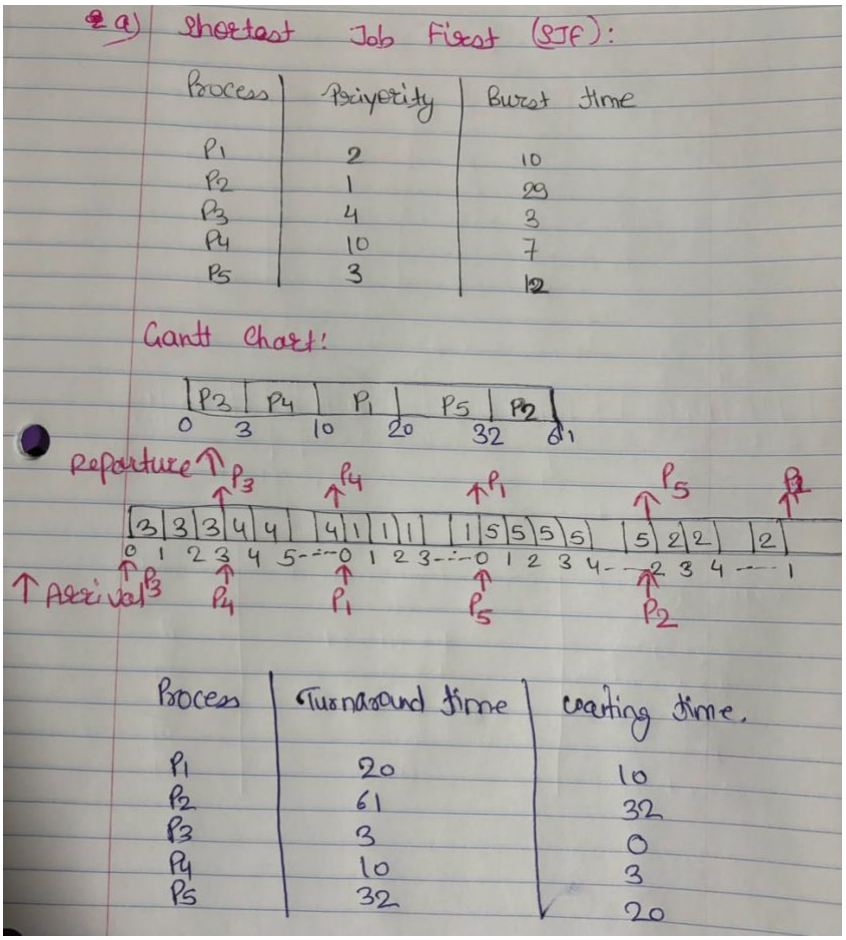
Average Times:

- **Average Waiting Time**: 3.2 **units**.
- **Average Turnaround Time**: 4.6 **units**.

Problem 2: Assume that a system has the following processes. Draw the Gantt chart and calculate the waiting and turnaround times for each of the following scheduling policies

a) Shortest Job First (SJF) scheduling algorithm.

- This algorithm can be non-preemptive, meaning once a process starts, it runs to completion.
- SJF minimizes the average waiting time but may suffer from the "starvation" problem, where longer processes are delayed indefinitely if shorter ones keep arriving.

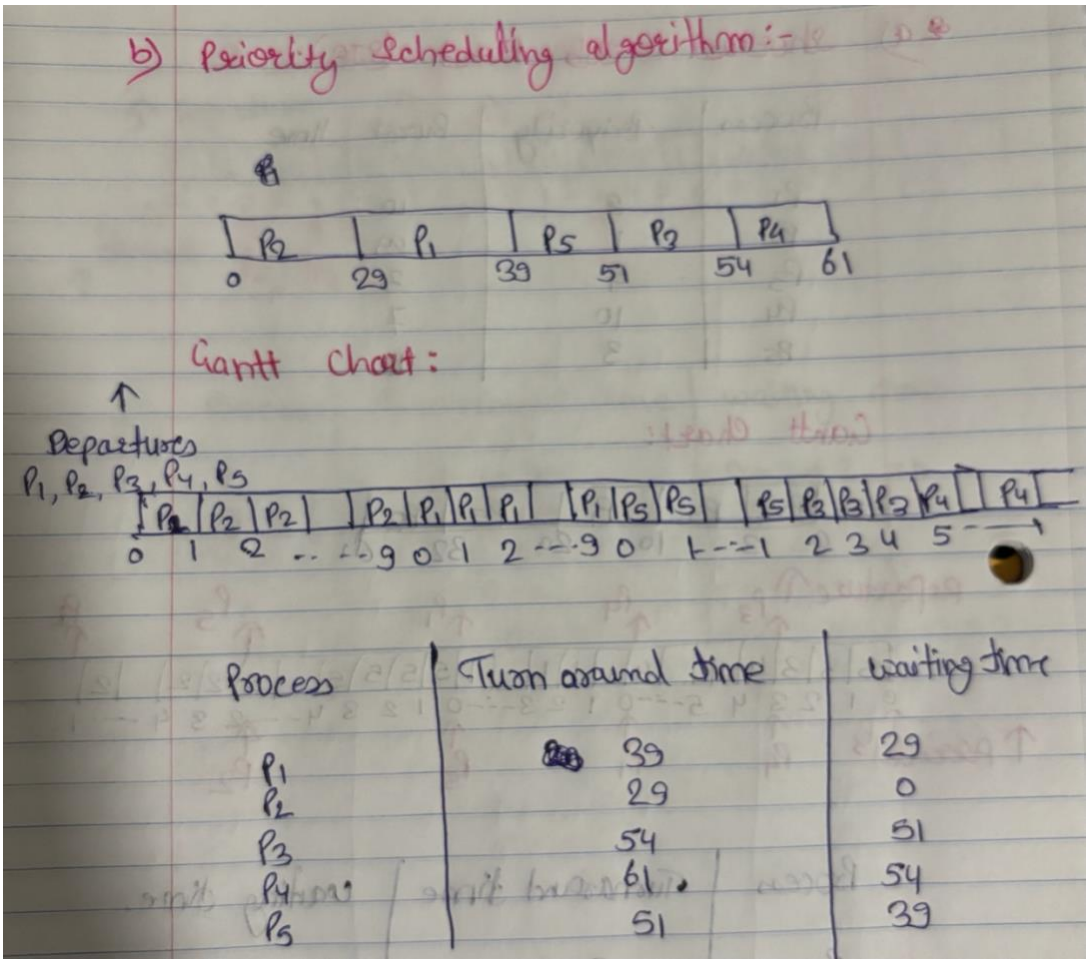


Average Times:

- **Average Waiting Time = 13 units.**
- **Average Turnaround Time= 25.2 units**

b) Priority scheduling algorithm (smaller priority number implies higher priority).

- In priority-based scheduling, the process with the highest priority (indicated by the lowest numerical value) is executed first.
- If a new process with a higher priority arrives, it interrupts the currently running process.
- This scheduling ensures that critical tasks are handled promptly but may cause lower-priority processes to wait longer.

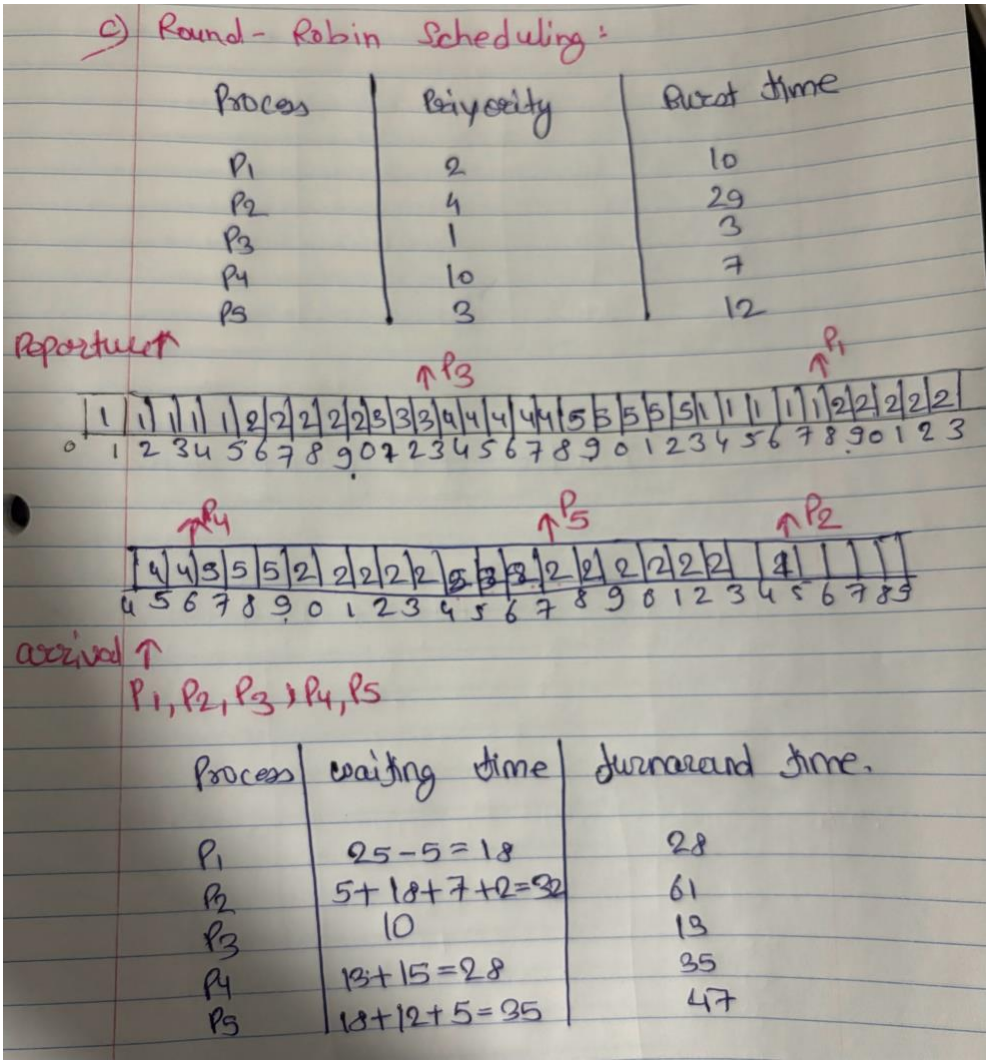


Average Times:

- **Average Waiting Time = 34.6 units.**
- **Average Turnaround Time= 46.8 units**

c) Round Robin scheduling algorithm with a quantum = 5.

- In Round Robin scheduling, each process is allocated up to 5 units of CPU time before it is rotated to the end of the queue.
- If a process is unable to complete within its time slice, it is paused, and the next process in the queue is scheduled.
- This approach ensures fairness by giving all processes equal time in a cyclic manner, preventing any single process from dominating the CPU.



Average Times:

- **Average Waiting Time** = 24.6 **units**.
- **Average Turnaround Time= 36.8 units**