Quiz 2

Course: Operating Systems	Course Code: CS 2006
Section: BCS-4E	Total Marks:10
Name:	RollNo:

Question 1: [10 Marks]

A system implements a Multi-Level Feedback Queue (MLFQ) scheduler with the following characteristics:

- **Queue 1** (Highest Priority): Time quantum = 3 ms, Round Robin.
- **Queue 2** (Medium Priority): Time quantum = 6 ms, Round Robin.
- **Queue 3** (Lowest Priority): FCFS (First-Come, First-Served).

At time **t = 0 ms**, five processes arrive in the system with the following burst times and priority boost intervals:

Process	Burst Time (ms)	Arrival Time (ms)	Priority Boost Interval (ms)
P1	10	0	20
P2	15	0	30
P3	8	0	16
P4	20	0	45
P5	17	0	24

Rules:

1. All processes start in **Queue 1**.
2. If a process does not finish within its time quantum, it moves to the next lower-priority queue.
3. After every **Priority Boost Interval** (calculated from the arrival time of the process), the process is **immediately moved and placed at the end of Queue 1** (if the process is not using CPU). **[e.g. for P1, 1st booster at 20 , 2nd at 40 , 3rd at 60 and so on. Same goes for others]**
4. If a process is currently executing (using CPU) in **Queue 2** or **Queue 3** when its priority boost interval is reached:
    - The process will **not surrender its current time slice** in Queue 2 but will be boosted to Queue 1 right after its time slice finishes.
    - The process will be **interrupted mid-execution in Queue 3 (FCFS)** and moved to Queue 1 at the end of the queue 1.
5. Processes in the same queue are scheduled based on the respective queue's scheduling policy. Context switching time is ignored.

Tasks:

1. Draw the Gantt chart for the schedule.
2. Calculate the turnaround time (TAT) and waiting time (WT) for each process and average.

M T W T F S DATE:

Quiz #2 Solution.

	BT	AT	Priority Boost Interval.
P_1	10	0	20, 40, 60.
P_2	15	0	30, 60
P_3	8	0	16, 32, 48, 64
P_4	20	0	45, 90
P_5	17	0	24, 48, 72

10 15 8 20 17 5 6 14 5 10 11

Queue 1: P_1 P_2 P_3 P_4 P_5 P_3 P_1 P_5 P_2 P_4 P_5

7 12 5 17 14 6 2 11 3 16 11 2 7 8

Queue 2: P_1 P_2 P_3 P_4 P_5 P_1 P_3 P_2 P_1 P_4 P_5 P_2 P_4 P_5

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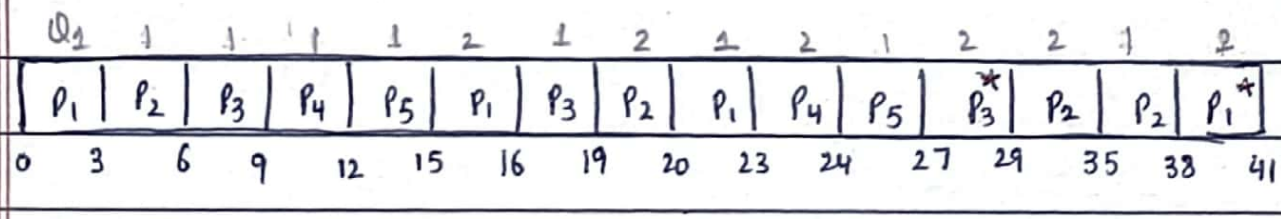
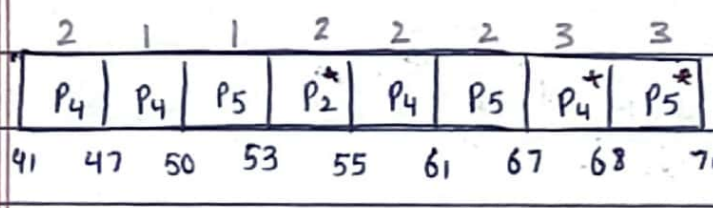
Queue 3: P_4 P_5

move up after completing the time slice.

Gantt Chart





	TAT	WT
P_1	41	31
P_2	55	40
P_3	29	21
P_4	68	48
P_5	70	53
	263/5	193/5
	= 52.6 ms	38.6 ms.