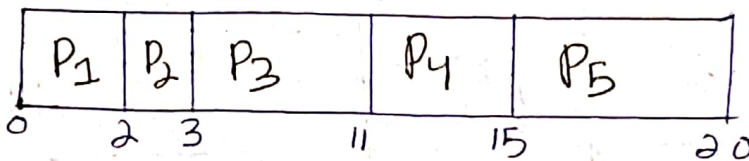


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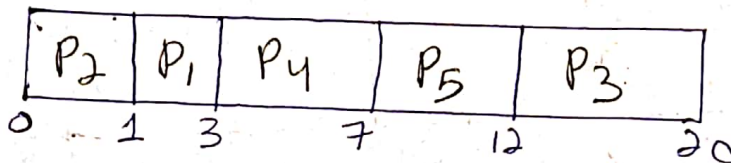
## Assignment #04

### Task #1

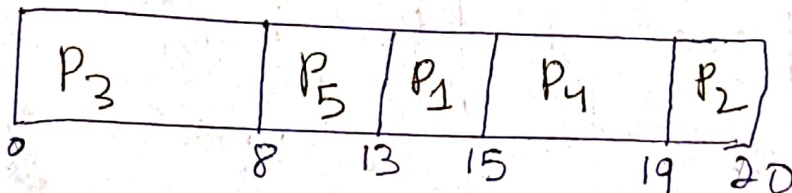
a) FCFS



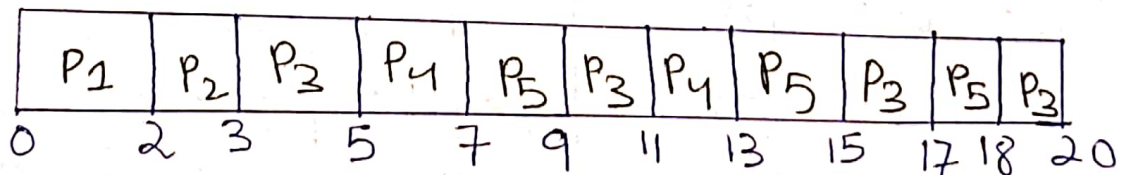
### SJF



### Priority



### Round Robin



- b) Turnaround Time (Completion time - Arrival Time)  
We assume the arrival time to be zero.

Process	FCFS	<del>Priority</del> SJF	Round Robin	Priority
P <sub>1</sub>	2	3	2	15
P <sub>2</sub>	3	1	3	20
P <sub>3</sub>	11	20	20	8
P <sub>4</sub>	15	7	13	19
P <sub>5</sub>	20	12	18	13

- c) Waiting time (Turnaround Time - Burst Time)

Process	FCFS	SJF	RR	Priority
P <sub>1</sub>	0	1	0	13
P <sub>2</sub>	2	0	2	19
P <sub>3</sub>	3	12	12	0
P <sub>4</sub>	11	3	9	15
P <sub>5</sub>	15	7	13	8

d) FCFS  $AVT = 6.2$

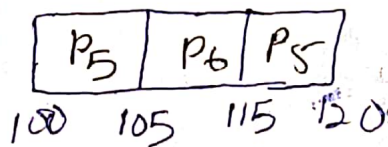
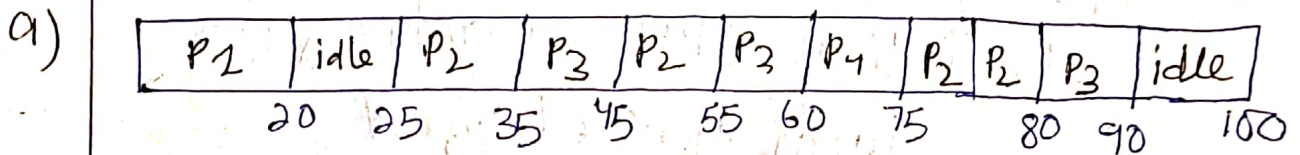
SJF  $AVT = 4.6$

P  $AVT = 11$

RR  $AVT = 7.2$

SJF has shortest average waiting time over all processes.

Task #02.



b) Turnaround time

$$T.A = CT - AT$$

$$P_1 = 20 - 0 = 20$$

$$P_2 = 80 - 25 = 55$$

$$P_3 = 90 - 30 = 60$$

$$P_4 = 75 - 60 = 15$$

$$P_5 = 120 - 100 = 20$$

$$P_6 = 115 - 105 = 10$$

c) Waiting Time:

$$WT = TA - BT$$

$$P_1 = 20 - 20 = 0$$

$$P_2 = 55 - 25 = 30$$

$$P_3 = 60 - 25 = 35$$

$$P_4 = 15 - 15 = 0$$

$$P_5 = 20 - 10 = 10$$

$$P_6 = 10 - 10 = 0$$

d) CPU utilization rate

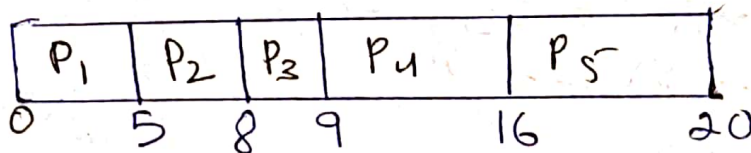
$$= \frac{\text{total time CPU was active} \times 100}{\text{total time elapsed}}$$

$$= \frac{120 - 15}{120} = \frac{105}{120} \times 100$$

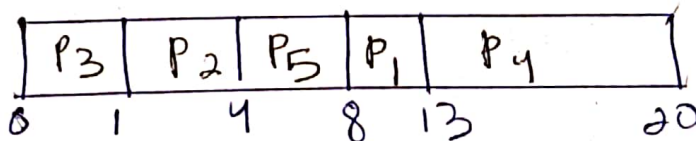
$$= 87.5\%$$

Task #03

a) FCFS



SJF





## Priority

$P_1$	$P_5$	$P_3$	$P_4$	$P_2$	
0	5	9	10	17	20

## Round Robin

P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>	P <sub>5</sub>	P <sub>1</sub>	P <sub>2</sub>	P <sub>4</sub>	P <sub>5</sub>	P <sub>1</sub>	P <sub>4</sub>
2	4	5	7	9	11	12	14	16	17	20

b) Turnaround time

Process	FCFS	SJF	Priority	RR
P <sub>1</sub>	5	13	5	17
P <sub>2</sub>	8	4	20	12
P <sub>3</sub>	9	1	10	5
P <sub>4</sub>	16	20	17	20
P <sub>5</sub>	20	8	9	16

c) Waiting Time

Process	FCFS	SJF	Priority	RR
P <sub>1</sub>	0	8	0	12
P <sub>2</sub>	5	1	17	9
P <sub>3</sub>	8	0	9	4
P <sub>4</sub>	9	13	10	13
P <sub>5</sub>	10	4	5	12

d) Average Time:

$$FCFS = 7.6$$

$$SJF = 5.2$$

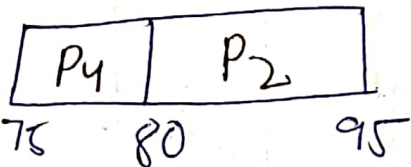
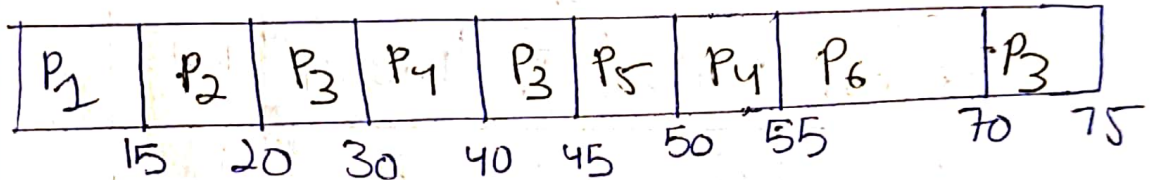
$$Priority = 8.2$$

$$RR = 10$$

SJF results in the minimum average waiting time over all processes.

Task #04

a)



b)

$$TA = CT - AT$$

$$P_1 = 15 - 0 = 15$$

$$P_2 = 45 - 0 = 45$$

$$P_3 = 75 - 20 = 55$$

$$P_4 = 80 - 25 = 55$$

$$P_5 = 50 - 45 = 5$$

$$P_6 = 70 - 55 = 15$$

c)  $WT = TA - BT$

$$P_1 = 15 - 15 = 0$$

$$P_2 = 95 - 20 = 75$$

$$P_3 = 55 - 20 = 35$$

$$P_4 = 55 - 20 = 35$$

$$P_5 = 5 - 5 = 0$$

$$P_6 = 15 - 15 = 0$$