Assignment No. 3

Q.1] Differentiate between preemtive and non-preemtive scheduling.

Ans.

Preemtive	Non-preemtive
1] process can be interrupted in between	1] Interrupt until it terminate itself or its time is up.
2] It has overhead of scheduling the process.	2] It does not have overhead
3] It is flexible	3] It is rigid
4] cost associated	4] No cost associated
5] CPU utilization high	5] CPU utilization low.
6] E.g - Round-Robin, Shortest remaining time first	6] E.g - FCFS, SJF

Q.2] Which of the following scheduling algorithm result in starvation

a] FCFS b] SJF c] Round-Robin d] Priority scheduling

Ans. b] SJF d] Priority scheduling.

1] In fcfs a process with very large burst time come before other process, the other process will have to wait long time but it is clear than other process will definitely get their chance to execute, so it will not suffer

from Starvation.

2] In Round-robin there is a fixed time quantum & every process will get their chance to execute, so no starvation here.

3] In priority scheduling, if higher priority process will keep on coming then low priority process will suffer from Starvation.

4] In SJF, if process with shortest process time keep priority process suffer from Starvation.

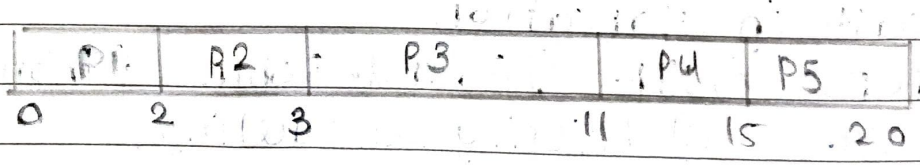
Q.3] consider the following set of process with length of CPU burst given in millisecond

Process	Burst Time	Priority
P1	2	2
P2	1	1
P3	8	4
P4	4	2
P5	5	3

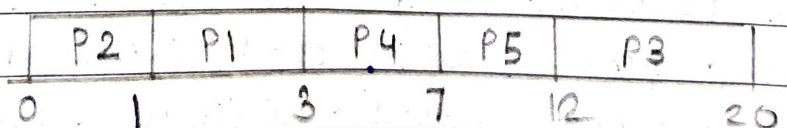
The process are assumed to have arrived in order P1, P2, P3, P4, P5 all at time 0.

Ans. a] Draw Gantt chart for following algorithm

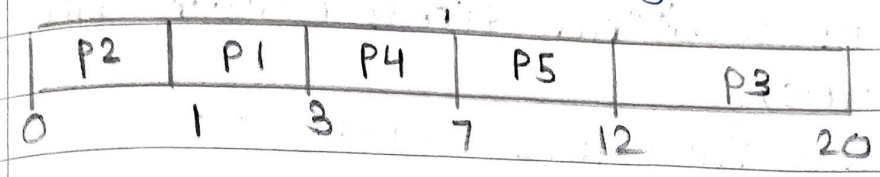
1] FCFS -



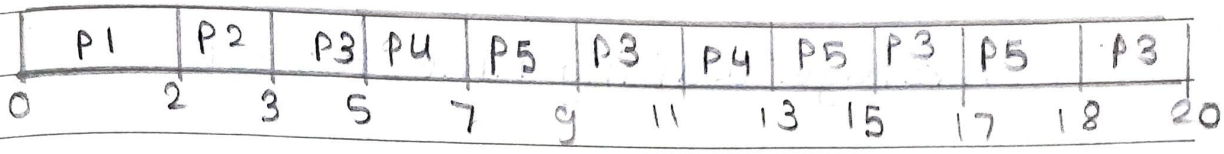
2] SJF



iii] Non preemtive priority scheduling :



iv] Round Robin - (7.9 = 2 m/s)



b] What is the turnaround time for each process for each of scheduling algorithm in part a?

Ans.

Process	FCFS	SJF	Priority	RR
P1	2	3	3	2
P2	3	1	1	3
P3	11	20	20	20
P4	15	7	7	13
P5	20	12	12	18

c] What is the waiting time for each process?

Ans.

Processes	FCFS	SJF	Priority	RR
P1	0	1	1	0
P2	2	0	0	2
P3	3	12	12	12
P4	11	3	3	9
P5	15	7	7	13

d] Which of the algorithm results in minimum average waiting time (over all processes)?

Ans. i) Average waiting time for FCFS

$$= \frac{0+2+3+11+15}{5} = 6.2$$

ii] Average waiting time for SJF

$$= \frac{1+0+12+3+7}{5} = 4.6$$

iii) Average waiting time for priority scheduling algorithm

$$= \frac{1+0+12+3+7}{5} = 4.6$$

iv) Average waiting time for Round Robin algorithm =

$$= \frac{0+2+12+9+13}{5}$$

$$= 7.2$$

- SJF and priority scheduling algorithm have same average waiting time. Therefore SJF and priority scheduling algorithm has minimum average waiting time over all processes.

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Q.4] Suppose that following process arrive for execution at time indicated, each process will run for amount of time listed. In answering the question use non preemtive scheduling and base all decision have information you have at time decision must be made.

Process	Arrival time	Burst time
P1	0.0	8
P2	0.4	4
P3	1.0	1

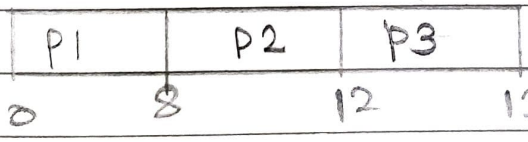
a] What is average turnaround time for this process with the FCFS scheduling algorithm?

Ans. ~~FCFS scheduling algorithm~~

Turnaround Time =

Completion Time - Arrival Time -
waiting time - turnaround time -
Burst Time

FCFS Gantt chart -



Process	completion time	Turnaround time	waiting time
P1	8	8-0 = 8	8-8 = 0
P2	12	12-0.4=11.6	11.6-4=7.6
P3	13	13-1.0=12	12-1 = 11

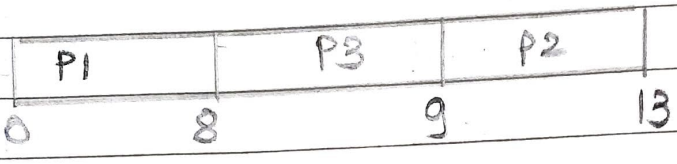
Average turnaround time =

$$= \frac{8 + 11.6 + 12}{3}$$

$$= \frac{31.6}{3} = 10.53$$

b] What is average turnaround time for this process with SJF?

Ans. Gantt chart -



Process	completion time	Turnaround time	waiting time
P1	8	8 - 0 = 8	0
P2	13	13 - 0.4 = 12.6	8.6
P3	9	9 - 1.0 = 8	7

Average turnaround time =

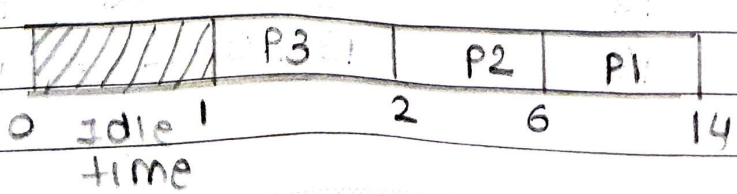
$$\frac{8 + 12.6 + 8}{3}$$

$$= \frac{28.6}{3}$$

$$= 9.53$$

c] SJF with 1 unit CPU idel time.

Ans. Gantt chart -



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Process	Arrival time	Burst time	CT	Turnaround time	waiting time
P1	0.0	8	14	14	6
P2	0.4	4	6	5.6	1.6
P3	1.0	1	2	1	0

Average Turnaround time =

$$\frac{14 + 5.6 + 1}{3}$$

$$= \frac{20.6}{3}$$

$$= 6.87$$