Home Work-2 A20457605

Process Scheduling Sasidhar. Dimmiti

5.3)

Process	Arrival Time (AT)	Burst Time (BT)	Completion Time (CT)	Turn Around Time (TAT) (CT − AT)	Waiting time (wt) TAT − BT
P_1	0.0	8	8	8	0
P_2	0.4	4	12	11.6	7.6
P_3	1.0	1	13	12	11

a) draw the Gantt Chart for FCFS cpu Scheduling algorithm.

P_1

P_1	P_2	P_3

0.0 8.0 12.0 13.0

$\therefore$ Average Turn Around Time (TAT) $= \frac{8+11.6+12}{3} = \frac{31.6}{3}$

$\boxed{\langle TAT \rangle = 10.53}$

b) Draw the gantt Chart for Shortest Job first (SJF) in non-preemptive mode.

P_1	P_3	P_2

0.0 8 9 13

Process	Arrival Time	Burst Time	Completion time	TAT (CT − AT)
P_1	0.0	8	8	8
P_2	0.4	4	13	12.6
P_3	1.0	1	9	8

∴ Average Turn Around Time will be

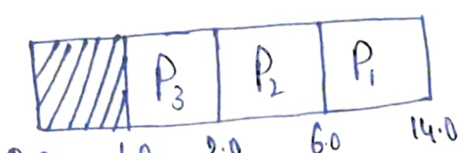
$$\langle TAT \rangle = \frac{8 + 12.6 + 8}{3} = \frac{28.6}{3} = \underline{\underline{9.53}}$$

ⓒ Given:-

Cpu is left idle for the first 1 unit
→ which means it doesn't take any resource from cpu is called cpu is in idle state.

∴ Gantt Chart

P_2 & P_3 Ready queue after 1 unit of time.



process	AT	BT	CT	TAT
P_1	0.0	8	14	14
P_2	0.4	4	6	5.4
P_3	1.0	1	2	1

In this case Average Turn Around Time will be

$$\langle TAT \rangle = \frac{14 + 5.4 + 1}{3} = \frac{20.4}{3} = \underline{\underline{6.8}}$$

→ In this case cpu performance increases.

5.4) (a)

process	BT	priority
P_1	2	2
P_2	1	1
P_3	8	4
P_4	4	2
P_5	5	3

→ Given all the processes are arrived at 0 Arrival Time

So We have 5 processes in Ready queue.

First Come first Serve (FCFS):-

→ Given having high number process having high priority.

P_1 P_2 P_3 P_4 P_5

Ready queue

Gantt chart

P_3	P_5	P_1	P_4	P_2

0 8 13 15 19 20

(∵ P_3 having high priority)

Shortest Job first (SJF) → Non-preemptive:-

Gantt chart:-

P_2	P_1	P_4	P_5	P_3

0 1 3 7 12 20

(∵ P_2 having less burst time)

Non-premptive priority:-

[We know that here largest num = highest priority]

Gantt chart Will be

P_3	P_5	P_1	P_4	P_2

0 8 13 15 19 20

Round Robin Algorithm (RR) :-

Given Time quantum = 2 units

Burst Time

~~2~~

~~1~~

~~8~~ ~~6~~ ~~4~~ ~~2~~

~~4~~ ~~2~~

~~5~~ ~~3~~ ~~1~~

queue

~~P_3~~	~~P_5~~	~~P_1~~	~~P_4~~	~~P_2~~	~~P_3~~	~~P_5~~	~~P_4~~	~~P_3~~	~~P_5~~	~~P_3~~

∴ Gantt Chart (If we Consider priority)

P_3	P_5	P_1	P_4	P_2	P_3	P_5	P_4	P_3	P_5	P_3

0 2 4 6 8 9 11 13 15 17 18 20

If we Consider all the process having same priority
[Because generally while doing the RR algorithm all the process having same priority]

Gantt Chart :-

~~P_1~~	~~P_2~~	~~P_3~~	~~P_4~~	~~P_5~~	~~P_3~~	~~P_4~~	~~P_5~~	P_3	P_5

P_1	P_2	P_3	P_4	P_5	P_3	P_4	P_5	P_3	P_5	P_3

0 2 3 5 7 9 11 13 15 17 18 20

(b) Turn around Time for each process & for each Scheduling algorithm.

FCFS:- We know that [TAT = Completion Time - Arrival Time.]

TAT = CT - AT [∵ AT = 0 given]

		TAT
For P_1 →	$15 - 0$	$= 15$
for P_2 →	$20 - 0$	$= 20$
for P_3 →	$8 - 0$	$= 8$
for P_4 →	$19 - 0$	$= 19$
for P_5 →	$13 - 0$	$= 13$

SJF:-

Given AT = 0 so TAT = CT so

(CT - AT) = TAT

for $P_1 \rightarrow 3 - 0 = 3$

for $P_2 \rightarrow 1 - 0 = 1$

for $P_3 \rightarrow 20 - 0 = 20$

for $P_4 \rightarrow 7 - 0 = 7$

for $P_5 \rightarrow 12 - 0 = 12$

Non-preemptive priority Algorithm:-

for $P_1 \rightarrow 15 - 0 = 15$

for $P_2 \rightarrow 20 - 0 = 20$

for $P_3 \rightarrow 8 - 0 = 8$

for $P_4 \rightarrow 19 - 0 = 19$

for $P_5 \rightarrow 13 - 0 = 13$

[CT - AT] = [TAT]

Round Robin :- (If we consider With priority)

for $P_1 \rightarrow 6 - 0 = 6$

for $P_2 \rightarrow 9 - 0 = 9$

for $P_3 \rightarrow 20 - 0 = 20$

for $P_4 \rightarrow 15 - 0 = 15$

for $P_5 \rightarrow 18 - 0 = 18$

[CT - AT] = [TAT]

If we Consider With out priority

for $P_1 \rightarrow 2 - 0 = 2$

for $P_2 \rightarrow 3 - 0 = 3$

for $P_3 \rightarrow 20 - 0 = 20$

for $P_4 \rightarrow 13 - 0 = 13$

for $P_5 \rightarrow 18 - 0 = 18$

[CT - AT] = [TAT]

(c) The waiting time of each process for each of these scheduling algorithms.

We know that "Waiting Time = Turn Around Time - Burst Time"

$$\boxed{WT = TAT - BT}$$

→ First Come First Serve (FCFS):-

	[TAT - BT]	= [WT]
for P_1 →	15 - 2	= 13
for P_2 →	20 - 1	= 19
for P_3 →	8 - 8	= 0
for P_4 →	19 - 4	= 15
for P_5 →	13 - 5	= 8

→ Shortest Job First (SJF):-

	[TAT - BT]	= [WT]
for P_1 →	3 - 2	= 1
for P_2 →	1 - 1	= 0
for P_3 →	20 - 8	= 12
for P_4 →	7 - 4	= 3
for P_5 →	12 - 5	= 7

→ Non-preemptive Priority:-

	[TAT - BT] = [WT]
for P_1 →	15 - 2 = 13
for P_2 →	20 - 1 = 19
for P_3 →	8 - 8 = 0
for P_4 →	19 - 4 = 15
for P_5 →	13 - 5 = 8

→ Round Robin Algorithm (RR):-

	[TAT - BT] = [WT]
for P_1 →	6 - 2 = 8
for P_2 →	9 - 1 = 8
for P_3 →	20 - 8 = 12
for P_4 →	15 - 4 = 11
for P_5 →	18 - 5 = 13

If we consider without priority

	[TAT - BT] = [WT]
for P_1 →	2 - 2 = 0
for P_2 →	3 - 1 = 2
for P_3 →	20 - 8 = 12
for P_4 →	13 - 4 = 9
for P_5 →	18 - 5 = 13

(d) We have to find minimum < Waiting Time>

→ for FCFS ⇒ $\langle WT \rangle = \frac{13+19+0+15+8}{5} = \frac{47}{5} = \boxed{9.4}$

→ for SJF ⇒ $\langle WT \rangle = \frac{1+0+12+3+7}{5} = 23/5 = \boxed{4.6}$

→ for Non-preemptive priority ⇒ $\langle WT \rangle = \frac{13+19+0+15+8}{5} = \frac{47}{5} = \boxed{9.4}$

→ for Round Robin ⇒ $\langle WT \rangle = \frac{8+8+12+11+13}{5} = \frac{52}{5} = \boxed{10.4}$

∴ SJF having the Min Average Waiting Time.

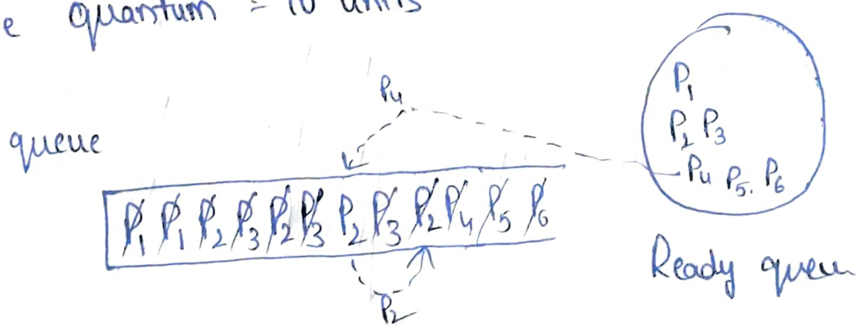
5.5)

Process	Priority	Burst Time	Arrival Time
P_1	40	20	0
P_2	30	25	25
P_3	30	25	30
P_4	35	15	60
P_5	5	10	100
P_6	10	10	105

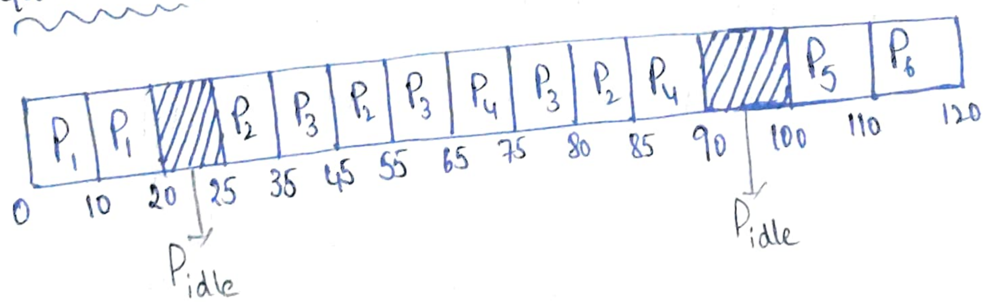
ⓐ <u>Given</u>:-

→ Highest number having High priority

→ Time quantum = 10 units



<u>Gantt Chart</u>:-



ⓑ The turnaround time for each process will be

Turnaround time = Completion time − Arrival time

$\boxed{TAT = CT - AT}$

	[CT - AT]	= [TAT]
for P_1 $\longrightarrow$	20 - 0	= 20
for P_2 $\longrightarrow$	85 - 25	= 60
for P_3 $\longrightarrow$	80 - 30	= 50
for P_4 $\longrightarrow$	90 - 60	= 30
for P_5 $\longrightarrow$	110 - 100	= 10
for P_6 $\longrightarrow$	120 - 105	= 15

(c) The Waiting time of each process for each of these Scheduling algorithms. We know that [Waiting Time = TurnAround Time - Burst Time]

for $\boxed{WT = TAT - BT}$

	[TAT - BT]	= [WT]
for P_1 $\longrightarrow$	20 - 20	= 0
for P_2 $\longrightarrow$	60 - 25	= 35
for P_3 $\longrightarrow$	50 - 25	= 25
for P_4 $\longrightarrow$	30 - 15	= 15
for P_5 $\longrightarrow$	10 - 10	= 0
for P_6 $\longrightarrow$	15 - 10	= 5

(d) CPU utilization rate :- We know that $\left[\text{CPU rate} = \left(\frac{\text{Total Cpu time}}{\text{Total time}}\right) \times 100\right]$

$\therefore$ Total cpu time = Sum of all burst time of processes
(or)
The time taken by the cpu to run all the process.

$\therefore$ Total Cpu time $= \sum$ (Burst time)

$= 20+25+25+15+10+10$

$= \underline{\underline{105}}$

Total Time → Time taken to execute the all processes

$= 120$

$\therefore$ Cpu utilization rate $= \left(\frac{105}{120}\right) \times 100$

$= 0.875 \times 100$

$\boxed{= 87.5\%}$

5.7)

a) priority & SJF

→ priority Scheduling determines the relative Significance of each activity by using Several Criteria, Such as deadlines.

→ The procedure with the least burst time is chosen next using SJF Scheduling

→ So, The priority and SJF Scheduling have no direct relationship. On the otherhand, priority Scheduling Can be thought of as a more universal variant in which burst times Corresponds to priority values. Priority Scheduling essentially transforms into SJF scheduling when every process has the same priority.

(b) Multilevel feedback Queues & FCFS :-

→ In multilevel feedback queues, operations are moved between queues according to predetermined Criteria and there are numerous queues with distinct Scheduling algorithms.

→ processes are Simply executed via FCFS Scheduling in the order they Come.

→ So, the FCFS Scheduling and multilevel feedback queues do not directly relate to one another. While multilevel feedback queues are more Sophisticated and adaptable and enable Several Scheduling algorithms with in each queue, FCFS is a basic scheduling technique.

(c) Priority and FCFS :-

→ priority Scheduling determines the relative Significance of each activity by using Several Criteria.

→ processes are Simply executed via FCFS Scheduling in the order they Come.

→ So, FCFS Scheduling and priority do not directly Correlate. These algorithms are fundamentally dissimilar. On the other hand priority Scheduling essentially turns into FCFS Scheduling if every process has Same priority.

(d) Round Robin and SJF :-

→ Each process in the queue receives a set time slice from RR Scheduling before going on to the nextone.

→ The procedure with the least burst time is chosen next using SJF Scheduling

→ So, The schedule of SJF & RR are not directly related. These are seperate algorithms based on different ideas. RR scheduling, on the other hand, is a proactive version of FCFS, while SJF prioritizes reducing average waiting time and turn around. When RR scheduling time quantum is set to a high value or to infinity, it resembles FCFS Scheduling rather than SJF Scheduling.