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Operating System

Digital Assignment 1

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Date: 30 Aug 2024

Consider the following set of processes with the length of the CPU burst given in miliseconds

Process	Arival Time	Burst time	Priority
P1	0	9	3
P2	1	4	1
P3	2	7	5
P4	4	6	4
P5	6	2	2

(a) Draw Gantt charts that illustrate the execution of these processes using the following scheduling algorithms :- FCFS, SJF, SRTF, Non-premptive and preemptive priority and RR (quantum=2)

(b) what is the turnaround time for each process for each of the scheduling algorithms in part a?

(c) what is the waiting time of each process for each of the scheduling algorithms?

(d) which of the algorithms results in minimum avg waiting time (over all processes)?

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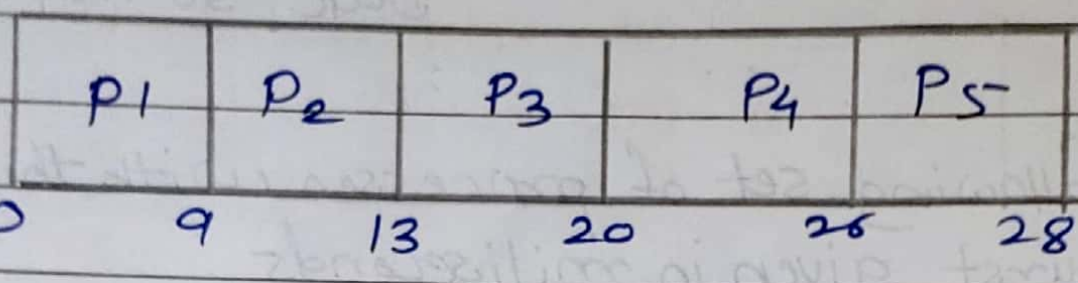
→ ① FCFS (First come First serve)



Process	Arrival Time (AT)	Finish Time (FT)	Turn Around T (FT-AT)	Wating Time (TAT-BT)
P_1	0	9	9	0
P_2	1	13	12	8
P_3	2	20	18	11
P_4	4	26	22	16
P_5	6	28	22	20

Avg. Turn Around Time = $\frac{9+12+18+22+22}{5}$

= 16.6

Avg. waiting Time = $\frac{0+8+11+16+20}{5}$

= 911

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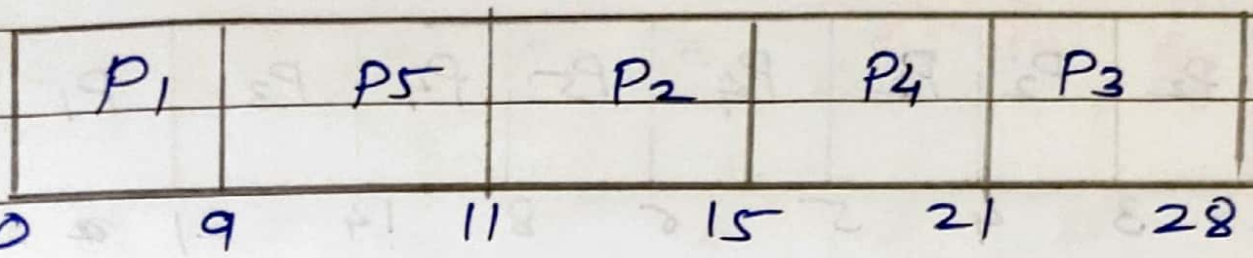
(2) Shortest Job first (SJF) - non-preemptive



Process	Arrival Time (AT)	Finish Time (FT)	Turn Around Time (TAT) = FT - AT	Waiting Time (WT) = TAT - BT
P1	0	9	9	0
P2	1	15	14	10
P3	2	28	26	19
P4	4	21	17	11
P5	6	11	5	3

Avg. Turn Around Time = $\frac{9+14+26+17+5}{5}$

$= 14.2$

Avg. waiting Time = $\frac{0+10+19+11+3}{5}$

$= 8.6$

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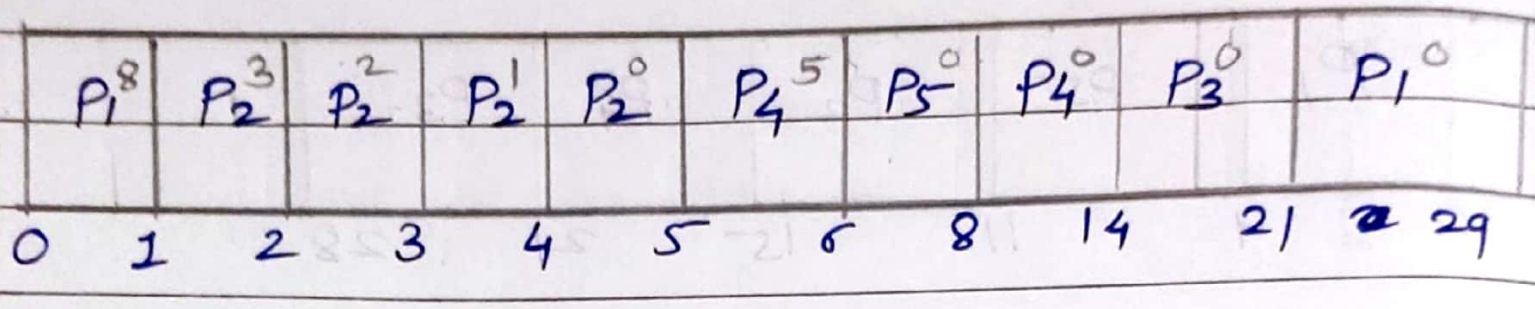
③ SRTF (Shortest Remaining Time First)-preemptive



Process	Arrival Time AT	Finish Time FT	Turn Around Time (TAT) = FT-AT	waiting Time (WT) = TAT-BT
P_1	0	29	29	20
P_2	1	5	4	0
P_3	2	21	19	12
P_4	4	14	10	4
P_5	6	8	2	0

Avg. Turn Around Time $= \frac{29+4+19+10+2}{5}$

$= 12.8$

Avg waiting Time $= \frac{20+0+12+4+0}{5}$

$= 7.2$

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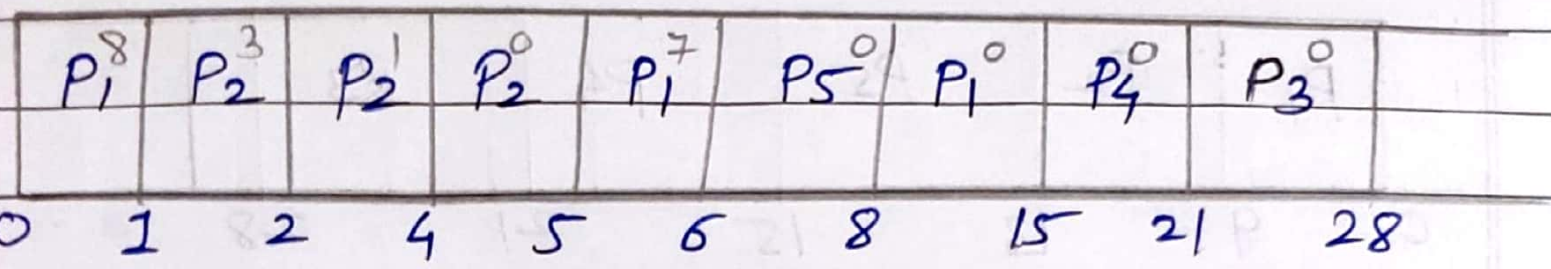
(4) Priority - preemptive



Process	Arrival Time (AT)	Finish Time FT	Turn Around Time (TAT) = FT - AT	waiting time = TAT - BT
P1	0	15	15	6
P2	1	5	4	0
P3	2	28	26	19
P4	4	21	17	11
P5	6	8	2	0

Avg. Turn Around time $= \frac{15+4+26+17+2}{5} = \frac{64}{5}$

$= 12.8$

Avg. waiting Time $= \frac{6+0+19+11+0}{5}$

$= 7.2$

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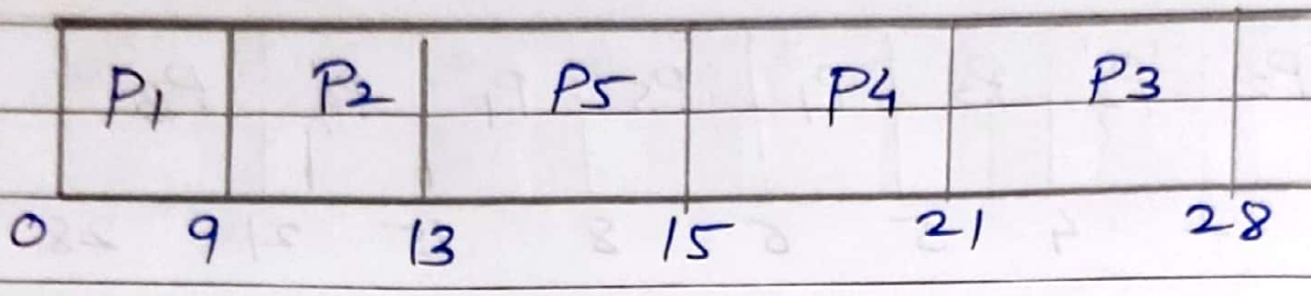
(5) Priority Non-preemptive



Procen	Arrival Time (AT)	Finish Time (FT)	TAT = FT - AT	WT = TAT - BT
P1	0	9	9	0
P2	1	13	12	8
P3	2	28	26	19
P4	4	21	17	11
P5	6	15	9	7

Avg. Turn Around Time $= \frac{9+12+26+17+9}{5}$

$= 14.6$

Avg. WT Time $= \frac{0+8+19+11+7}{5}$

$= 9$

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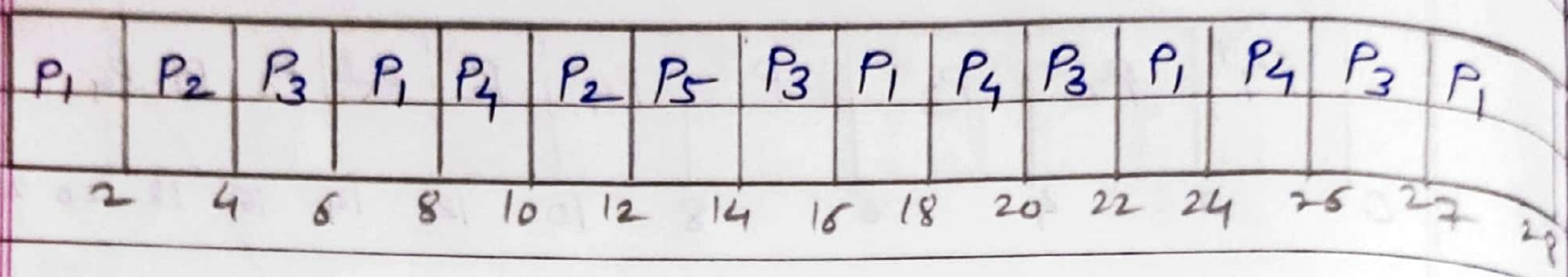
(6) Round Robin



AT Time (T)	Ready Queue
2	$P_1(\cancel{9}^{7})$ $P_2(4)$ $P_3(7)$ $P_1(7)$
4	$P_2(\cancel{4}^{2})$ $P_3(7)$ $P_1(7)$ $P_4(6)$ $P_2(2)$
6	$P_3(\cancel{7}^{5})$ $P_1(7)$ $P_4(6)$ $P_2(2)$ $P_5(2)$ $P_3(5)$
8	$P_1(\cancel{7}^{5})$ $P_4(6)$ $P_2(2)$ $P_5(2)$ $P_3(5)$ $P_1(5)$
10	$P_4(\cancel{8}^{4})$ $P_2(2)$ $P_5(2)$ $P_3(5)$ $P_1(5)$ $P_4(4)$
12	$P_2(\cancel{2}^{0})$ $P_5(2)$ $P_3(5)$ $P_1(5)$ $P_4(4)$
14	$P_5(\cancel{2}^{0})$ $P_3(5)$ $P_1(5)$ $P_4(4)$
16	$P_3(\cancel{5}^{3})$ $P_1(5)$ $P_4(4)$ $P_3(3)$
18	$P_1(\cancel{5}^{3})$ $P_4(4)$ $P_3(3)$ $P_1(3)$
20	$P_4(\cancel{4}^{2})$ $P_3(3)$ $P_1(3)$ $P_4(2)$
22	$P_3(\cancel{3})$ $P_1(3)$ $P_4(2)$ $P_3(1)$
24	$P_1(\cancel{3})$ $P_4(2)$ $P_3(1)$ $P_1(1)$
26	$P_4(\cancel{2}^{0})$ $P_3(1)$ $P_1(1)$
27	$P_3(\cancel{1}^{0})$ $P_1(1)$
28	$P_1(\cancel{1}^{0})$

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Procem	AT	FT	TAT = FT - AT	WT TAT - BT
P1	0	28	28	19
P2	1	12	11	7
P3	2	27	25	18
P4	4	26	22	16
P5	6	14	8	6

Avg. Turn Around Time $= \frac{28+11+25+22+8}{5}$

$= 18.8$

Avg. waiting Time $= \frac{19+7+18+16+6}{5}$

$= 13.2$

Conclusion :-

SRTF (Shortest remaining time first) and priority (preemptive) algorithms are having minimum Avg. waiting time with T = 7.2