

OS TUTORIAL: **Scheduling Algorithm**

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CS-A

Q1.

	Arrival	Burst	1/0	Burst	1/0
P ₀	0	10	2	7	1
P ₁	0	20	4	14	2
P ₂	0	30	6	21	3

$$\begin{aligned} P_0 &= 20\% \times 10 = 2 \\ P_1 &= 20\% \times 20 = 4 \\ P_2 &= 30\% \times 20 = 6 \end{aligned} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{I/O}$$

$$\begin{aligned} P_0 &= 70\% \times 10 = 7 \\ P_1 &= 70\% \times 20 = 14 \\ P_2 &= 70\% \times 30 = 21 \end{aligned} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{Computation}$$

$$\begin{aligned} P_0 &= 10\% \times 10 = 1 \\ P_1 &= 10\% \times 20 = 2 \\ P_2 &= 10\% \times 30 = 3 \end{aligned} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{I/O}$$

Idle	P ₀	P ₀	P ₀	P ₁	P ₂	Idle
0	2	4	6	9	23	44
						47

After 4, P₀ P₁, P₀ < P₁

After 6, P₀ P₁ P₂, P₀ < P₁, P₂

After 9, P₁ P₂, P₁ < P₂ (9 + 14 = 23)

After 23, P₂ (23 + 21) = 44

After 44, Idle for 3 units as P₂ takes max I/O time.

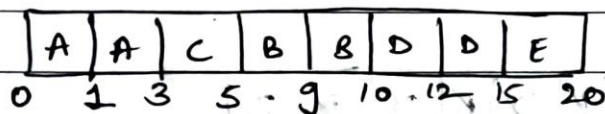
Total time = 47

Idle time = 2 + 3 = 5

% Idle time = $\frac{5}{47} \times 100 = 10.6\%$

Q2	Process	AT	BT	Priority
	A	0	3	2
	B	1	5	1
	C	3	2	3
	D	9	5	4
	E	12	5	4

1. SJF = Preemptive



AT	Process	BT
0	A	3
1	B	5
3	C	2
9	D	5
12	E	5

At 0, only A arrives

At 1, A, B are there, $A < B$

At 3, B, C are there, $C < B$

At 5, only B

At 9, B, D are there, $B < D$

At 10, only D

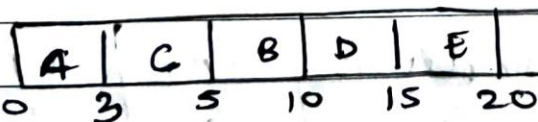
At 12, D, E, $D < E$

At 15, E executes.

P	Comp1	TAT	WT
A	3	3	0
B	10	9	4
C	5	2	0
D	15	6	1
E	20	8	3

2. SJF - Non Preemptive

here the processes are scheduled as per their burst time with the least timed-process being given the max priority.



P	Comp1	TAT	WT
A	3	3	0
B	10	9	4
C	5	2	0
D	15	6	1
E	20	8	3

A arrives first, so it starts execution.

B, C are there, $C < B$

All the others arrive accordingly & get executed at once.

3. Round Robin $TS = 1, 2$

$TS = 2$	Process	AT	BT	Completion	TAT	WT	RT
	A	0	2 1 0	5	5	2	0
	B	1	5 8 1 0	12	11	6	1
	C	3	2 0 1	7	4	2	2
	D	9	5 8 1 0	17	8	3	0
	E	12	5 8 0	20	8	3	2

$TS = 2$

Ready Queue
 0 A B A C B D B D E D

Running Queue
 0 A B A C B D B D E D E
 0 2 4 5 7 9 11 12 14 16 17 20

$TS = 1$

Ready Queue

Running Queue
 0 A B A B C A B C B D B D E D E D E D
 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

E E
 18 19 20

$TS = 1$	Process	AT	BT	Completion	TAT	WT	RT
	A	0	3	6	6	3	0
	B	1	5	11	10	5	0
	C	3	2	8	5	3	1
	D	9	5	18	9	4	0
	E	12	5	20	8	3	0

4. Priority = Preemptive

Process	AT	BT	Priority	Completion	(CT-AT)	(TAT-BT)
A	0	8 20	2	8	8	5
B	1	4 0	1	6	5	0
C	3	2 0	3	10	7	5
D	9	5	4	15	6	1
E	12	5	4	20	8	3

	A	B	B	A	C	D	E	
0		1	3	6	8	10	15	20

5. Priority = Non-Preemptive

Process	AT	BT	Priority	Completion	TAT	WT
A	0	3	2	3	3	0
B	1	5	1	8	7	2
C	3	2	3	10	7	5
D	9	5	4	15	6	1
E	12	5	4	20	8	3

A	B	C	D	E	
0	3	8	10	15	20