

Problem-01:

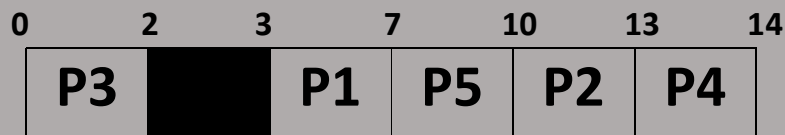
Consider the set of 5 processes whose arrival time and burst time are given below-

Process Id	Arrival time	Burst time
P1	3	4
P2	5	3
P3	0	2
P4	5	1
P5	4	3

If the CPU scheduling policy is FCFS, calculate the average waiting time and average turn around time.

Solution:

Gantt Chart –



The black box between 2 and 3 is CPU idle time

Formulae –

- 1) Turn Around time = Exit time – Arrival time
- 2) Waiting time = Turn Around time – Burst time

Process Id	Exit time	Turn Around time	Waiting time
P1	7	$7 - 3 = 4$	$4 - 4 = 0$
P2	13	$13 - 5 = 8$	$8 - 3 = 5$
P3	2	$2 - 0 = 2$	$2 - 2 = 0$
P4	14	$14 - 5 = 9$	$9 - 1 = 8$
P5	10	$10 - 4 = 6$	$6 - 3 = 3$

Therefore,

Average Turn Around time = $(4 + 8 + 2 + 9 + 6) / 5 = 29 / 5 = 5.8$ unit

Average Waiting time = $(0 + 5 + 0 + 8 + 3) / 5 = 16 / 5 = 3.2$ unit

Problem-02:

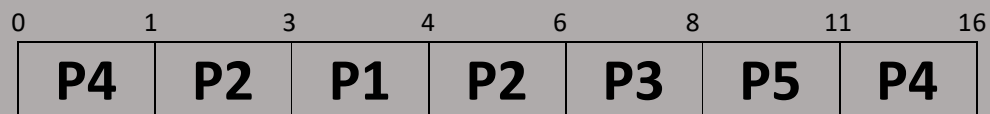
Consider the set of 5 processes whose arrival time and burst time are given below-

Process Id	Arrival time	Burst time
P1	3	1
P2	1	4
P3	4	2
P4	0	6
P5	2	3

If the CPU scheduling policy is SJF preemptive, calculate the average waiting time and average turn around time.

Solution:

Gantt Chart –



Formulae –

- 1) Turn Around time = Exit time – Arrival time
- 2) Waiting time = Turn Around time – Burst time

Process Id	Exit time	Turn Around time	Waiting time
P1	4	$4 - 3 = 1$	$1 - 1 = 0$
P2	6	$6 - 1 = 5$	$5 - 4 = 1$
P3	8	$8 - 4 = 4$	$4 - 2 = 2$
P4	16	$16 - 0 = 16$	$16 - 6 = 10$
P5	11	$11 - 2 = 9$	$9 - 3 = 6$

Therefore,

Average Turn Around time = $(1 + 5 + 4 + 16 + 9) / 5 = 35 / 5 = 7$ unit

Average Waiting time = $(0 + 1 + 2 + 10 + 6) / 5 = 19 / 5 = 3.8$ unit

Problem-03:

Consider the set of 6 processes whose arrival time and burst time are given below-

Process Id	Arrival time	Burst time
P1	0	7
P2	1	5
P3	2	3
P4	3	1
P5	4	2
P6	5	1

If the CPU scheduling policy is shortest remaining time first, calculate the average waiting time and average turn around time.

Solution:

Gantt Chart –

0	1	2	3	4	6	7	9	13	19
P1	P2	P3	P4	P3	P6	P5	P2	P1	

Formulae –

- 1) Turn Around time = Exit time – Arrival time
- 2) Waiting time = Turn Around time – Burst time

Process Id	Exit time	Turn Around time	Waiting time
P1	19	$19 - 0 = 19$	$19 - 7 = 12$
P2	13	$13 - 1 = 12$	$12 - 5 = 7$
P3	6	$6 - 2 = 4$	$4 - 3 = 1$
P4	4	$4 - 3 = 1$	$1 - 1 = 0$
P5	9	$9 - 4 = 5$	$5 - 2 = 3$
P6	7	$7 - 5 = 2$	$2 - 1 = 1$

Therefore,

Average Turn Around time = $(19 + 12 + 4 + 1 + 5 + 2) / 6 = 43 / 6 = 7.17$ unit

Average Waiting time = $(12 + 7 + 1 + 0 + 3 + 1) / 6 = 24 / 6 = 4$ unit

Problem-04:

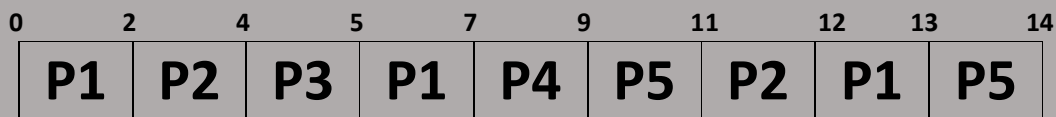
Consider the set of 5 processes whose arrival time and burst time are given below-

Process Id	Arrival time	Burst time
P1	0	5
P2	1	3
P3	2	1
P4	3	2
P5	4	3

If the CPU scheduling policy is Round Robin with time quantum = 2 unit, calculate the average waiting time and average turn around time.

Solution:

Gantt Chart –



Formulae –

- 1) Turn Around time = Exit time – Arrival time
- 2) Waiting time = Turn Around time – Burst time

Process Id	Exit time	Turn Around time	Waiting time
P1	13	$13 - 0 = 13$	$13 - 5 = 8$
P2	12	$12 - 1 = 11$	$11 - 3 = 8$
P3	5	$5 - 2 = 3$	$3 - 1 = 2$
P4	9	$9 - 3 = 6$	$6 - 2 = 4$
P5	14	$14 - 4 = 10$	$10 - 3 = 7$

Therefore,

Average Turn Around time = $(13 + 11 + 3 + 6 + 10) / 5 = 43 / 5 = 8.6$ unit

Average Waiting time = $(8 + 8 + 2 + 4 + 7) / 5 = 29 / 5 = 5.8$ unit