waiting time:-

$P_4 = 3-3 = 0$

$P_1 = 9-6 = 3$

$P_3 = 16-7 = 9$

$P_2 = 24-8 = 16$

$\therefore$ Average waiting time $= \frac{0+3+9+16}{4} = \frac{28}{4}$

$= 7$ mili sec.

3) Priority Based or Event-Driven Scheduling:-

⇒ A Priority number (integer) is associated with each Process. The basic idea is straightforward: each Process is assigned a Priority, and Priority is allowed to run. Equal-Priority Processes are Scheduled in FCFS order. The Shortest-Job-First (SJF) algorithm is a special case of general Priority Scheduling algorithm. SJF is a Priority Scheduling where Priority is the Predicted next CPU burst time. The CPU is allocated to the Process with the highest Priority (smallest integer = highest Priority). Equal Priority Processes are Scheduled FCFS. Priority can be defined either internally or, externally. Internally defined Priorities use some measurable quantities or qualities to compute Priority of a Process. Priority Scheduling can be either Preemptive or, non-Preemptive.

Example:
Consider the following set of five Processes, assumed to have arrived at the same time. find average waiting time.

Process	Arrival Time	Priority
P_1	10	3
P_2	1	1
P_3	2	4
P_4	1	5
P_5	5	2

=> Gantt Chart:

P_2	P_5	P_1	P_3	P_4

0 1 6 16 18 19

waiting time:

$P_2 = 1-1 = 0$

$P_5 = 6-5 = 1$

$P_1 = 16 - 10 = 6$
$P_3 = 18 - 2 = 16$
$P_4 = 19 - 1 = 18$

∴ Average waiting time $= \frac{0+1+6+16+18}{5}$

$= 8.2$ mili sec.

4.) Round Robin (RR) Scheduling:-

⇒ one of the oldest, simplest, fairest and most widely used algorithm is round robin (RR). The round robin scheduling algorithm is primarily used in time-sharing and multi user system environment where the primary requirement is to provide reasonably good response times and in general to share the system fairly among all system users. Basically the CPU time is divided into the time slices. Each process is allocated a small time-slice called quantum. No process can run for more than quantum while others are waiting in the ready queue. After the time has elapsed, the process is preempted and added to the end of the ready queue ~~If Here~~

Example:
Consider the following set of Process with the Processing time given in miliseconds and Quantum time is 4 milisec. find average waiting time.

Process	Processing time
P_1	24
P_2	03
P_3	03

⇒ Gantt chart:

P_1	P_2	P_3	P_1	P_1	P_1	P_1	P_1
0–4	4–7	7–10	10–14	14–18	18–22	22–26	26–30

waiting time:

$P_1 = 30 - 24 = 6$

$P_2 = 7 - 3 = 4$

$P_3 = 10 - 3 = 7$

∴ Average waiting time $= \frac{6+4+7}{3} = \frac{17}{3} = 5.66$

- CPU utilization — Keep the CPU as busy as Possible.

CPU utilization = (Processor Busy Time)/(Processor Busy time + Processor Idle Time).

- Throughput – Number of processes that complete their execution per time unit.

Throughput = (No. of processes complete) / (Time unit)

- Turnaround Time – amount of time to execute a particular process.

Turnaround Time = t(Process complete) – (Process submitted)

- Waiting time – amount of time a process has been waiting in the ready queue.

Waiting Time = Turnaround Time – Processing Time.

- Response Time – amount of time it takes from when a request was submitted until the first response is produced, not output.

Response Time = t(first Response) – t(submission of request).