Question-1: Consider the following set of processes having their burst time mentioned in milliseconds. CPU-burst time indicates that for how much time, the process needs the CPU.

Process	Burst Time (ms)
P_1	20
P_2	7
P_3	5

Calculate the average waiting time if the processes arrive in the order of:
  i. P_1, P_2, P_3
  ii. P_2, P_3, P_1
  iii. P_3, P_1, P_2
  iv. P_3, P_2, P_1

Question-2:

Process	Arrival Time	Burst Time
P_1	0	8
P_2	1	4
P_3	2	9
P_4	3	5

Calculate average waiting time in:
  i.   Preemptive SJF scheduling
  ii.   Non-preemptive SJF scheduling

Question-3: Consider the following set of processes, assumed to have arrived at time 0, in the order $P_1, P_2..... P_5$, with the length of the CPU burst time given in milliseconds:

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

Using priority scheduling calculate average waiting time.

Question-4: Calculate average waiting time for preemptive priority scheduling

Process	Burst Time	Priority	Arrival Time
P_1	10	3	0
P_2	5	2	1
P_3	2	1	2

Question-5: Consider the following set of processes that arrives at time 0 ms.

Process	Burst Time
P_1	20
P_2	3
P_3	4

If we use time quantum of 4 ms then calculate the average waiting time using RR scheduling.

Question-6: Consider the set of processes given in the table and the following scheduling algorithm:
(i) Shortest Job First (SJF)
(ii) Shortest Remaining Job First (SRJF)

Process id	Arrival Time	Execution Time
A	0	7
B	1	5
C	2	3
D	6	2
E	12	3

If there is a tie within the processes, the tie is broken in the favour of the oldest process. Draw the Gantt chart and find the average waiting time and turnaround time for the two algorithms. Comment on your result which one is better and why?

Question-7: Consider a system with a set of processes P1, P2 and 3 and their CPU burst times, priorities and arrival times being mentioned as below:

Process	CPU Burst Time	Arrival Time	Priority
P1	5	0	2
P2	15	1	3
P3	10	2	1

Assuming 1 to be highest priority, calculate the following:
  i.   Average waiting time using FCFS, SJF (Preemptive and Non-Preemptive) and Priority (Preemptive and Non-Preemptive) scheduling mechanism.
  ii.   Average turnaround time using FCFS, SJF (Preemptive and Non-Preemptive) and Priority (Preemptive and Non-Preemptive) scheduling mechanism.
  iii. Assume time quantum to be 2 units of time. Calculate average waiting time and average turnaround time using Round-Robin scheduling.

Question-8: For the following table draw a chart illustrating their execution using:
  i.   First-Come First-Served
  ii.   Shortest Job First
  iii. Shortest Remaining Time
  iv.   Round Robin (quantum=2)
  v.   Round Robin (quantum=1)

Process	Arrival Time	Processing Time
P_0	0.0	3
P_1	1.0	6
P_2	4.0	4
P_3	6.0	2

Question-9: Referring Question-8 what is the average turn-around time using:
  i.   First-Come First-Served
  ii.   Shortest Job First
  iii. Shortest Remaining Time
  iv.   Round Robin (quantum=2)
  v.   Round Robin (quantum=1)

Question-10: Referring Question-8 what is the waiting time for each process using:
  i.   First-Come First-Served
  ii.   Shortest Job First
  iii. Shortest Remaining Time
  iv.   Round Robin (quantum=2)

v.   Round Robin (quantum=1)

Question-11: Referring Question-8 find the average throughput using:
   i.   First-Come First-Served
   ii.   Shortest Job First
   iii.   Shortest Remaining Time
   iv.   Round Robin (quantum=2)
   v.   Round Robin (quantum=1)

Question-12: For the following four processes A, B, C, D draw a Gantt chart illustrating their execution using priority scheduling. (Assume larger priority number has higher priority).
   i.   Preemptive
   ii.   Non-Preemptive

Process	Arrival Time	Burst Time	Priority
A	0.000	4	3
B	1.001	3	3
C	2.001	3	6
D	3.001	5	5

Question-13: Consider the following set of processes, with the length of CPU burst given in milliseconds:

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

The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4, P_5, all at time 0.

   i.   Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, SJF, non preemptive priority (a smaller priority number implies a higher priority), and RR (quantum=1).
   ii.   What is the turnaround time of each process for each of the scheduling algorithms in part I?
   iii.   What is the waiting time of each process for each of the scheduling algorithms in part I?
   iv.   Which of the algorithms in part I results in the minimum average waiting time (over all process)?