

CPU Scheduling Practice Questions

BTech-IV Semester (CSE-A & C)

1. Consider a uniprocessor system executing three tasks T1, T2 and T3, each of which is composed of an infinite sequence of jobs (or instances) which arrive periodically at intervals of 3, 7 and 20 milliseconds, respectively. The priority of each task is the inverse of its period and the available tasks are scheduled in order of priority, with the highest priority task scheduled first. Each instance of T1, T2 and T3 requires an execution time of 1, 2 and 4 milliseconds, respectively. Given that all tasks initially arrive at the beginning of the 1st milliseconds and task preemptions are allowed, In how many milliseconds the first instance of T3 completes its execution? **(GATE-CS-2017)**

2. Consider the following CPU processes with arrival times (in milliseconds) and length of CPU bursts (in milliseconds) as given below:

Process	Arrival time	Burst time
P1	0	7
P2	3	3
P3	5	5
P4	6	2

If the pre-emptive shortest remaining time first scheduling algorithm is used to schedule the processes, then the average waiting time across all processes is ____ milliseconds. **(GATE-CS-2011)**

3. Consider the following CPU processes with arrival times (in milliseconds) and length of CPU bursts (in milliseconds) as given below. Calculate Average Waiting Time for Round Robin Algorithm with Time Slice=2. **(GATE-CS-2019)**

Process Id	Arrival time	Burst time
P1	0	4
P2	1	5
P3	2	2
P4	3	1
P5	4	6
P6	6	3

4. Consider the following CPU processes with arrival times (in milliseconds) and length of CPU bursts (in milliseconds) as given below: **(GATE-CS-2006)**

Process	Arrival time	Burst time
P1	0	7
P2	3	3
P3	5	5
P4	6	2

If the pre-emptive shortest remaining time first scheduling algorithm is used to schedule the processes, then the average waiting time across all processes is _____ milliseconds.

5. Consider the set of processes with arrival time (in milliseconds), CPU burst time (in milliseconds) , and priority (0 is the highest priority) shown below. None of the processes have I/O burst time.

Process	Arrival time	Burst Time	Priority
P1	0	11	2
P2	5	28	0
P3	12	2	3
P4	2	10	1
P5	9	16	4

The average waiting time (in milliseconds) of all the processes using preemptive priority scheduling algorithm is _____.

6. Consider the following processes, with the arrival time and the length of the CPU burst given in milliseconds. The scheduling algorithm used is preemptive shortest remaining-time first.

Process	Arrival Time	Burst Time
P1	0	10
P2	3	6
P3	7	1
P4	8	3

The average turn around time of these processes is milliseconds _____.

7. Consider the following set of processes that need to be scheduled on a single CPU. All the times are given in milliseconds.

Process Name	Arrival Time	Execution Time
A	0	6
B	3	2
C	5	4
D	7	6
E	10	3

Using the shortest remaining time first scheduling algorithm, the average process turnaround time (in msec) is _____

8. Three processes A, B and C each execute a loop of 100 iterations. In each iteration of the loop, a process performs a single computation that requires t_c CPU milliseconds and then initiates a single I/O operation that lasts for t_{io} milliseconds. It is assumed that the computer where the processes execute has sufficient number of I/O devices and the OS of the computer assigns different I/O devices to each process. Also, the scheduling overhead of the OS is negligible. The processes have the following characteristics:

Process id	t_c	t_{io}
A	100 ms	500 ms
B	350 ms	500 ms

C 200 ms 500 ms

The processes A, B, and C are started at times 0, 5 and 10 milliseconds respectively, in a pure time sharing system (round robin scheduling) that uses a time slice of 50 milliseconds. The time in milliseconds at which process C would complete its first I/O operation is _____.

9. Consider the following four processes with arrival times (in milliseconds) and their length of CPU bursts (in milliseconds) as shown below:

Process	P1	P2	P3	P4
Arrival time	0	1	3	4
CPU burst time	3	1	3	Z

These processes are run on a single processor using preemptive Shortest Remaining Time First scheduling algorithm. If the average waiting time of the processes is 1 millisecond, then the value of Z is _____.

10. An operating system uses *shortest remaining time first* scheduling algorithm for preemptive scheduling of processes. Consider the following set of processes with their arrival times and CPU burst times (in milliseconds):

Process	Arrival Time	Burst Time
P1	0	12
P2	2	4
P3	3	6
P4	8	5

The average waiting time (in milliseconds) of the processes is _____.

11. Consider the following set of processes, with the arrival times and the CPU-burst times given in milliseconds (GATE-CS-2004)

Process	Arrival time	Burst Time
P1	0 ms	5 ms
P2	1 ms	3 ms
P3	2 ms	3 ms
P4	4 ms	1 ms

What is the average turnaround time for these processes with the preemptive shortest remaining processing time first (SRPT) algorithm?