OPERATING SYSTEMS – PART 2

SCHEDULING ALGORITHMS 1

(Terms and Description)

1. The reasons for desirable processes included terms such as turnaround time, wait time and response time.
In the following table, column 1 contains terms and column 2 contains its description. Match the terms to their appropriate description.

Terms	Description
1. Turn around time	a. The time duration between process getting into ready queue and process getting CPU for the first time.
2. Wait time	b. The time process spends waiting for the CPU.
3. Response time	c. The time duration between the terminated state and ready state [this is taken from the first time process enters the ready state]

a) 1 - c, 2 - b, 3 – a

b) 1 - c, 2 - a, 3 - b

c) 1 - b, 2 - c, 3 – a

d) 1 - a, 2 - b, 3 - c

(Scheduling Processes: Problem 1)

2. Consider the set of 5 processes whose arrival time and burst time are given below. What is the average turnaround time and average waiting time if the scheduling algorithm used is First Come First Served (FCFS) scheduling?

Process ID	Arrival Time	Burst Time
P1	5	4
P2	0	3
P3	1	2
P4	7	1
P5	4	6

a) Turnaround time: 7.2 units, Waiting time: 4.3 units

b) Turnaround time: 5.1 units, Waiting time: 3.1 units

c) Turnaround time: 6.6 units, Waiting time: 3.4 units

d) Turnaround time: 6.9 units, Waiting time: 5.1 units

(Scheduling Processes: Problem 2)

3. Consider the following four processes with their corresponding arrival time and burst time:

Process	Arrival Time	Burst Time (in ms)
P1	0	8
P2	0.6	6
P3	3.8	4
P4	4.4	2

What is the average turnaround time (in ms) for these processes using FCFS scheduling algorithm?

a) 15 b) 12.8

c) 13 d) None of the above options

(Convoy Effect)

4. What is the Convoy Effect?

Note: This problem was asked in VMware

(Scheduling Processes: Problem 3)

5. Consider the following set of processes with their arrival times and burst time (in milliseconds) as given below. If the Operating System uses Shortest Job First Scheduling algorithm, what is the average waiting time of the processes?

Process ID	Arrival Time	Burst Time
P1	0	7
P2	3	5
P3	5	11
P4	10	4

a) 4.25 milliseconds b) 4.90 milliseconds

c) 2.35 milliseconds d) 5.72 milliseconds

(Preemptive Scheduling)

6. Consider the following scenarios with respect to CPU scheduling decisions:

i. A process switches from running state to waiting state
ii. A process switches from the running state to the ready state
iii. A process switches from the waiting state to the ready state.
iv. A process terminates.

A Preemptive Scheduling can take place among which of the following scenarios?

a) ii and iii b) i and iv c) i and iii d) i and ii

(Non Preemptive Scheduling)

7. Consider the following scenarios with respect to CPU scheduling decisions:

i. A process switches from running state to waiting state
ii. A process switches from the running state to the ready state
iii. A process switches from the waiting state to the ready state.
iv. A process terminates.

A Non Preemptive Scheduling can take place among which of the following scenarios?

a) ii and iii b) i and iv c) i and iii d) i and ii

(Scheduling Processes: Problem 4)

8. 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 (in ms)
P1	0	7
P2	3	3
P3	5	5
P4	6	2

If the preemptive shortest job first scheduling algorithm is used to schedule the process, then the average waiting time of all processes is _____ milliseconds.

a) 4 b) 5 c) 3 d) 6

(Scheduling Processes: Problem 5)

9. 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 job first.

Process	Arrival Time	Burst Time (in ms)
P1	0	10
P2	3	6
P3	7	1
P4	8	3

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

a) 8.25 b) 8.26 c) 8.27 d) 8.28

(Scheduling Processes: Problem 6)

10. 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 (in ms)	Priority
P1	0	11	2
P2	5	28	0
P3	12	2	3
P4	2	10	1
P5	5	16	4

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

a) 32 b) 31 c) 30 d) 29

ASSIGNMENT

(FCFS Scheduling)

11. The arrival times and burst times for a set of 5 processes are given below. If First Come First Served (FCFS) scheduling algorithm is followed, and there is 2 units of overhead in the scheduling the processes, then what is the efficiency of the algorithm?

Process ID	Arrival Time	Burst Time
P1	0	5
P2	1	4
P3	2	2
P4	3	7
P5	4	3

a) 81.2% b) 67.7% c) 72.3% d) 71.4%

(Find average waiting time)

12. 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 a preemptive Shortest Job First scheduling algorithm. If the average waiting time of the processes is 1 millisecond, then the value of Z is _____

(Preemptive Shortest Remaining Time First Scheduling)

13. Consider the following set of processes with their arrival times and burst time (in milliseconds) as given below. If the Operating System uses Preemptive Shortest Job First Scheduling algorithm, then what is the average turnaround time of the processes?

Process ID	Arrival Time	Burst Time
P1	0	11
P2	4	8
P3	6	2
P4	9	4

a) 9.2 milliseconds b) 10 milliseconds

c) 8.3 milliseconds d) 11 milliseconds

(Preemptive Priority Scheduling)

14. Consider the following set of processes with their arrival times and burst time (in milliseconds)and priority (0 is the highest priority) as given below.

None of the processes have I/O burst time. If the Operating System uses Preemptive Priority Scheduling algorithm, what is the average waiting time of the processes?

Process ID	Arrival Time	Burst Time	Priority
P1	0	10	2
P2	4	19	1
P3	10	1	3
P4	3	9	0

a) 15 milliseconds

b) 16 milliseconds

c) 14 milliseconds

d) 13 milliseconds

(Non Preemptive Priority Scheduling)

15. Consider the following set of processes with their arrival times and burst time (in milliseconds)and priority (higher number means higher priority) as given below. None of the processes have I/O burst time. If the Operating System uses Non Preemptive Priority Scheduling algorithm, then what is the average turnaround time and average waiting time of the processes?

Process ID	Arrival Time	Burst Time	Priority
P1	0	5	1
P2	1	7	3
P3	2	3	2
P4	3	4	4

a) Turnaround time: 12.32 milliseconds, Waiting time: 7 milliseconds

b) Turnaround time: 11.56 milliseconds, Waiting time: 7 milliseconds

c) Turnaround time: 10.75 milliseconds, Waiting time: 6 milliseconds

d) Turnaround time: 13.43 milliseconds, Waiting time: 6 milliseconds

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