Branch : CSE & IT Batch:Hinglish

WEEKLY TEST – 02

Subject : Operating System

Topic : CPU Scheduling

Maximum Marks 15

Q.1 to 5 Carry ONE Mark Each

[NAT]

1. Consider the following set of processes, with the arrival times and the CPU-burst times given in milliseconds.

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

What is the average turnaround time for these processes with the shortest remaining processing time first algorithm? (Up to 1 decimal point).

[MCQ]

2. Which of the following scheduling algorithm is/are implementable?

(i) FCFS (ii) SJF

(iii) SRTF (iv) LRTF

(v) HRRN (vi) RR

(a) (i), (v) and (vi) (b) (ii), (iii) and (iv)

(c) (i), (vi) (d) None of these

[MCQ]

3. Consider the following set of processes:

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

What is the average turnaround time and average waiting time when the processes are scheduled using First Come First Serve (FCFS) algorithm?

(a) TAT = 7.25 and WT = 6.25

(b) TAT = 6.8 and WT = 4.9

(c) TAT = 8.6 and WT = 4.6

(d) TAT = 5.25 and WT = 3.5

[NAT]

4. Consider the set of processes.

Process	Arrival time	Burst time	Priority
P1	0	2	4
P2	1	4	1
P3	2	8	2
P4	3	5	3

Assume that the above processes are scheduled using non-pre-emptive priority scheduling (Highest number have highest priority). What is the average turnaround time (in ms)? (Up to 2 decimal points)

[MCQ]

5. Consider the following table of arrival time and burst time (all in msec) for 4 processes P_1, P_2, P_3 and P_4

Process	Arrival time	Burst time
P1	1	8
P2	3	3
P3	0	6
P4	5	5

If the highest response ratio next CPU scheduling algorithm is used to schedule the processes, then which two processes has minimum turnaround time and minimum waiting time?

(a) P1 and P2 (b) P2 and P3

(c) P3 and P4 (d) P4 and P1

Q.6 to 10 Carry TWO Mark Each

[NAT]

6. A process is executed in 150 msec. It takes 8 msec for the CPU to decide which process to execute. Then how much percentage of CPU time is used for scheduling.

[MCQ]

7. Consider the set of following processes.

Process	Arrival time	Burst time
P1	1	2
P2	0	3
P3	5	6
P4	3	8

Assume that the processes are scheduled using the non-pre-emptive Longest Job First (LJF) algorithm. What are the average turnaround time and average waiting time?

(a) 8.5 and 4.5 (b) 10.2 and 5.5
(c) 3.6 and 1.2 (d) 7.5 and 3.5

[NAT]

8. Consider the following proposed CPU scheduling algorithm:

Step 1: START
Step 2: Make a ready queue of the Processes say REQUEST.
Step 3: Do steps 4 and 5 WHILE queue REQUEST becomes empty.
Step 4: Pick the first process from the ready queue and allocate the CPU to it for a time interval of 1 time quantum.
Step 5: After the time quantum expires, select the process with minimum burst time.
Step 6: END

Let the time quantum = 10 milliseconds

Using this scheduling algorithm, calculate average waiting time for the given following processes.

Process	Arrival Time	Burst Time
P1	0	6
P2	4	15
P3	12	25
P4	15	20
P5	19	36

[MCQ]

9. Consider a set of 5 processes with burst time 7, 8, 5, 6, 12, all arrive at time zero. What is the minimum achievable average waiting time for these processes in non-pre-emptive scheduler?

(a) 15.6 (b) 12.0
(c) 14.5 (d) 17.0

[MSQ]

10. In non-preemptive priority scheduling if priority of five processes are 3, 4, 2, 1(highest), 5 and burst time is 7, 8, 9, 12, 3 respectively. If all the processes arrived at time zero, then which of the following statements is/are incorrect.

(a) If priority of P4 and P5 is swapped then average waiting time will be reduced.
(b) P2 can never complete its execution before P3
(c) Total turnaround time will be 26
(d) If priority of P4 and P5 is swapped then average waiting time = average turnaround time.

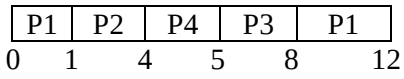
Answer Key

1. **(5.5)**
2. **(c)**
3. **(c)**
4. **(10.00)**
5. **(b)**
6. **(5)**
7. **(b)**
8. **(16.8)**
9. **(b)**
10. **(c, d)**

Hints and Solutions

1. (5.5)

Gantt Chart:



Turnaround time for

P1 = 12 – 0 = 12

P2 = 4 – 1 = 3

P3 = 8 – 2 = 6

P4 = 5 – 4 = 1

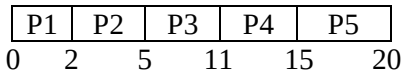
Average turnaround time = $\frac{(12+3+6+1)}{4} = 5.5$

2. (c)

FCFS and RR are implementable because they do not need knowledge of burst time aprior of process execution. Whereas, SJF, SRTF, LRTF, HRRN all need to know process's burst time in advance, which is practically not possible.

3. (c)

Gantt Chart:



Process	Arrival time	Burst time	Completion Time	Turnaround Time	Waiting Time
P1	0	2	2	2	0
P2	1	3	5	4	1
P3	2	6	11	9	3
P4	3	4	15	12	8
P5	4	5	20	16	11

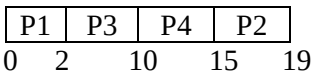
Average Turnaround time = $\frac{(2+4+9+12+16)}{5}$

= 8.6

Average waiting time = $\frac{(0+1+3+8+11)}{5} = 4.6$

4. (10.00)

Gantt Chart:



Process	Arrival time	Burst time	Priority	Completion Time	Turnaround Time
P1	0	2	4	2	2
P2	1	4	1	19	18
P3	2	8	2	10	8
P4	3	5	3	15	12

Average turnaround time = $\frac{(2+18+8+12)}{4} = 10.00$

5. (b)

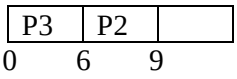
At time 6, all the processes arrived, calculating response ratio

For P1 = (5 + 8)/ 8 = 1.625

For P2 = (3+3)/3 = 2

For P4 = (1 +5)/5 = 1.2

So, P2 will be scheduled next.

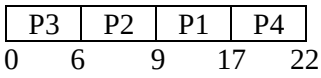


Calculating response ratio for P1 and P4

For P1 = (8 + 8)/ 8 = 2

For P4 = (4 + 5)/5 = 1.8

So, P1 will be scheduled next, and P4 will be scheduled at last.



Process	Arrival time	Burst time	Completion Time	Turnaround Time	Waiting Time
P1	1	8	17	16	8
P2	3	3	9	6	3
P3	0	6	6	6	0
P4	5	5	22	17	12

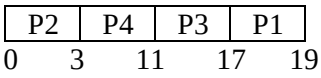
So, process P2 and P3 has minimum turnaround time i.e., 6 and 6 respectively.

And, process P2 and P3 have minimum waiting time i.e., 3 and 0 respectively.

6. (5)

CPU takes 8 ms to decide which process to execute, and then execute that process for 150 ms.
How much % of CPU time is used for scheduling = efficient time for CPU scheduling
So, efficiency of CPU scheduling = Useful time/ total time
Useful time (i.e. time required for scheduling) =8 ms
Total time (i.e. total time required for a process including execution time also) = 150ms + 8ms
Efficiency = 8/(150 + 8) = 0.0505 = 5.05%
Percentage of CPU time is used for scheduling= 5% (approx.)

7. (b)

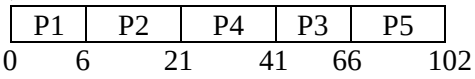


Process	Arrival time	Burst time	Completion Time	Turnaround Time	Waiting Time
P1	1	2	19	18	16
P2	0	3	3	3	0
P3	5	6	17	12	6
P4	3	8	11	8	0

Average turnaround time = $\frac{(18+3+12+8)}{4}$ =10.25

Average waiting time = $\frac{(16+0+6+0)}{4}$ = 5.5

8. (16.8)

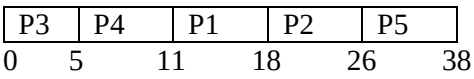


WT(P1) = 0
WT (P2) = 2
WT (P3) = 29
WT (P4) = 6
WT (P5) = 47
Average waiting time = 16.8

9. (b)

SJF (non-pre-emptive) algorithm is the most optimal algorithm and provide minimum average waiting time. So, to achieve minimum average waiting time, we will use SJF.

Process	Arrival time	Burst time
P1	0	7
P2	0	8
P3	0	5
P4	0	6
P5	0	12

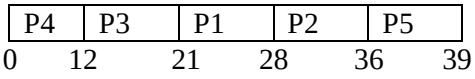


Waiting time = TAT – BT
WT(P1) = 11 WT (P2) = 18
WT (P3) = 0 WT (P4) = 5
WT (P5) = 26
Average Waiting time = 60/5 = 12

10. (c, d)

Process	Arrival time	Burst time	Priority
P1	0	7	3
P2	0	8	4
P3	0	9	2
P4	0	12	1 (highest)
P5	0	3	5

Gantt Chart:

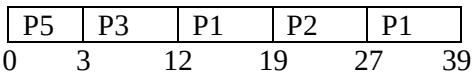


Average waiting time = 19.4
Average turnaround time = 27.2

If priority of P4 and P5 is swapped:

Process	Arrival time	Burst time	Priority
P1	0	7	3
P2	0	8	4
P3	0	9	2
P4	0	12	5
P5	0	3	1

Gantt Chart:



Average waiting time = 12.2
Average turnaround time = 20

(a) If priority of P4 and P5 is swapped then average waiting time will be reduced. Correct.
(b) P2 can never complete its execution before P3. P2 has higher lower priority than P3, so Correct.
(c) Total turnaround time will be 27.2. Incorrect. Total turnaround time is 136, average turnaround time is 27.2.
(d) If priority of P4 and P5 is swapped then average waiting time = average turnaround time. Incorrect.

Option C and d are incorrect.

For more questions, kindly visit the library section: Link for web: https://smart.link/sdfez8ejd80if

PW Mobile APP: https://smart.link/7wwosivoicgd4