Branch : CSE & IT Batch : Hinglish

Operating System

CPU Scheduling

DPP 02

[MCQ]

1. Consider arrival time and execution time for the following processes.

Process	Arrival time	Burst time
P0	2	5
P1	7	9
P2	8	3
P3	10	4

Assume, each context switch requires 1ms of time (excluding first and last context switch), then calculate the sum of schedule length, turnaround time of P3, and waiting time for P1 using SRTF algorithm?

(a) 39 (b) 34

(c) 40 (d) 25

[NAT]

2. Consider arrival time and execution time for the following processes that need to be scheduled on a single CPU.

Process	Arrival time	Burst time
P0	1	4
P1	6	3
P2	7	9
P3	5	5

Assume X is the total number of contexts switching and Y is the throughput of the system using SJF scheduling algorithm then find the value of (X + Y)? (Exclude start and end context switching and round-off up to 2 decimal).

[NAT]

3. Consider the following set of processes with the arrival times and the CPU burst times given in milliseconds:

Process	Arrival time	Burst time
P0	0	4
P1	2	3
P2	3	4
P3	5	5
P4	1	2

What does the average turnaround time for these processes with the shortest remaining process time first (SRTF) algorithm? (If burst time is matching them follow lowest arrival time and round-off up to 1 decimal).

[MCQ]

4. Five jobs are waiting to be run. Their expected running time are 12, 5, 7, 3 and "X". Which of the following order will minimize the average completion time using the shortest job first (SJF)?

(a) 3, X, 5, 7, 12

(b) 3, 5, X, 7, 12

(c) 3, 5, 7, X, 12

(d) 3, 5, 7, 12, X

[NAT]

5. Consider a pre-emptive SJF scheduling technique followed by three processes P_1, P_2, P_3. All these 3 processes arrive at time t = 0 and their total execution time is 30, 40, and 50 units respectively. Each process spends the first 10% of execution doing I/O, 80% of CPU and the rest 10% doing I/O operation.

What will be the CPU idle % time to execute all processes?

(Assume a uniprocessor and all I/O operations can be overlapped, round off upto 2 decimal).

[MCQ]

6. Consider the following processes:

Process	Arrival time	Burst time
P0	3	2
P1	6	3
P2	12	3
P3	5	2
P4	25	4

What is the throughput using the first come first serve(FCFS) algorithm, where scheduling overhead requires 2 unit (excluding first and last context switch)?

(a) 0.16 (b) 0.17

(c) 0.18 (d) 0.28

[MSQ]

7. Match List I with List II, and select the correct answer using the code below:

List I	**List II**
(i) SJF	1. Premptive
(ii) SRTF	2. Non-Preemptive
(iii) FCFS	3. Starvation

(a) i) - 1, ii)- 2, iii)-3
(b) i)- 3, ii)- 1, iii)- 2
(c) i)- 2, ii)-1, iii) 2
(d) i)-3, ii)-3, iii) 2

Answer Key

1. **(c)**
2. **(3.19)**
3. **(7.6)**
4. **(a)**
5. **(7.69)**
6. **(b)**
7. **(b, c, d)**

Hint & Solutions

1. (c)

Gantt Chart for the above process:

IDLE	P0	CS	P2	CS	P3	CS	P1

0 2 7 8 11 12 16 17 26

Process	Arrival Time	Burst Time	Completion Time	Turn-around Time	Waiting Time
P0	2	5	7	5	0
P1	7	9	26	19	10
P2	8	3	11	3	0
P3	10	4	16	6	2

Schedule length = 26 – 2 = 24
Turnaround time of P3 = 6
Waiting time of P1 = 10
So, 24 + 6 + 10 = 40
Therefore, option C is correct.

2. (3.19)

Gantt Chart for the above process:

IDLE	P0	P3	P1	P2

0 1 5 10 13 22

Total number of context switches:
Throughput = Number of processes/ Schedule length
= 4/ (22 – 1)
= 4/21
= 0.190
So, X + Y = 3 + 0.190 = 3.19

3. (7.6)

Gantt Chart for the above process:

Ready queue: P0 P4 P0 P1 P2 P3

P0	P4	P0	P1	P2	P3

0 1 3 6 9 13 18

Process	Arrival time	Burst time	Completion time	Turnaround Time
P0	0	4	6	6
P1	2	3	9	7
P2	3	4	13	10
P3	5	5	18	13
P4	1	2	3	2

Average TAT = (6 + 7 + 10 + 13 + 2)/ 5 = 7.6

4. (a)

For shortest job first (SJF), to get the minimum average completion time the value of x should be as minimum as possible.
In the option a x is placed in the second position so, the value of x must be ≤ 3. Now if we put the x value 3 then the minimum average completion time will be:
(3 + 6 + 11 + 18 + 30)/5 = 13.6

5. (7.69)

Scheduling algorithm is preemptive SJF = SRTF

Process	Burst Time	I/O	CPU	I/O
P1	30	3	24	3
P2	40	4	32	4
P3	50	5	40	5

IDLE	P1	P2	P3	IDLE

0 3 27 59 99 104

Hence,
CPU idle time = (3 – 0) + (104 – 99) = 3 + 5 = 8
Total time taken to complete all processes = 104
CPU idle percentage = (8 / 104) * 100 = 7.69%

6. (b)

IDLE	P0	CS	P3	CS	P1	CS	P2	CS	IDLE	CS	P4

0 3 5 7 9 11 14 16 19 21 25 27 31

Throughput = Total processes/ Schedule length
= 5 / (31 – 3)
= 5/28
= 0.17
Therefore, B is the correct answer.

7. (b, c, d)

SJF is non- preemptive in nature and has starvation.
SRTF is preemptive in nature and has starvation.
FCFS is non-preemptive in nature and do not have starvation.
Therefore, option b, c, and d are correct.