Branch : CSE & IT Batch:Hinglish

WEEKLY TEST – 01

Subject : Operating System

Topic : Intro and Background, Process Management & CPU Scheduling

Maximum Marks 20

Q.1 to 6 Carry ONE Mark Each

[MSQ]

1. Which of the following is/are example of Hard real time operating system?

(a) Satellite Launch

(b) Missile Control System

(c) DVD player

(d) Air Traffic Control

[NAT]

2. How many of the following is/are privileged instruction?

i. Set value of timer.
ii. Access I/O device.
iii. Issue a trap instruction.
iv. Switch from user to kernel mode.
v. Switch from kernel to user mode
vi. Modify entries in device-status table.
vii. Read the clock.
viii. Clear memory.
ix. Turn off interrupts

[MSQ]

3. Which of the following is/are correct?

(a) User processes can only be executed when mode bit is 0.

(b) User processes can only be executed when mode bit is 1.

(c) Kernel processes can only be executed when mode bit is 0.

(d) Kernel processes can only be executed when mode bit is 1.

[MSQ]

4. Which of the following is/are correct?

(a) Mode shifting is required to switch from User mode to Kernel mode.

(b) Mode shifting is required to switch from Kernel mode to User mode.

(c) Interrupt is raised to change mode bit 1 to 0.

(d) Interrupt is raised to change mode bit 0 to 1.

[MCQ]

5. Which of the following process state is not present in uni-programmed OS?

(a) New state (b) Ready State

(c) Block state (d) Suspend state

[NAT]

6. Consider a scenario, in a multi-programmed OS, a process A is running in non-pre-emptive mode, another process B with high priority arrives. How many of the following scenarios are possible?

(i) Process A will move from Ready to Running state.
(ii) Process B will move from Ready to Running state.
(iii) Process A will be blocked till the time Process B is in running state.
(iv) Process A will move to Ready state from running state till the time process B is in running state.
(v) Process B will move from Block state to Running state.

Q.7 to 13 Carry TWO Mark Each

[MCQ]

7. Which of the following scheduler plays major role in time-shared operating system?

(a) Long Term Scheduler
(b) Medium Term Scheduler
(c) Short Term Scheduler
(d) All of these have equal role in Time-shared OS.

[NAT]

8. Consider the following processes, scheduled as per First come first serve scheduling algorithm?

Process	Arrival Time	Burst Time
P1	10	4
P2	5	6
P3	6	1
P4	1	2

Suppose X is the number of context switches including context switch for first and last process, Y is the total time CPU remain idle, and Z is the total waiting time. Calculate (X*Y)+Z?

[MCQ]

9. Consider the following processes, scheduled as per Shortest Job first scheduling algorithm?

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

Calculate the difference between average turnaround time and average waiting time?

(a) 3.25 (b) 4.5
(c) 6.25 (d) 7.5

[MCQ]

10. Consider the following processes, scheduled as per Shortest remaining time first.

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

Calculate the average waiting time?

Note: If two process has equal remaining burst time then they will be scheduled as per first come first serve basis.

(a) 3 (b) 3.25
(c) 2 (d) 2.25

[MSQ]

11. Which of the following is/are incorrect statements?

(a) SJF gives the optimal average turnaround time among all scheduling algorithms.
(b) FCFS may suffer from starvation.
(c) SJF may suffer from starvation.
(d) SRTF do not have starvation.

[MCQ]

12. Which of the following pre-emptive scheduling algorithm suffers from convoy effect?

(a) FCFS
(b) SJF
(c) SRTF
(d) None of the above

[MSQ]

13. Which of the following scheduling queue is/are present in main memory?

(a) Ready queue
(b) Block queue
(c) Device queue
(d) Input queue

Answer Key

1. **(a, b, d)**
2. **(7)**
3. **(b, c)**
4. **(a, b, c)**
5. **(b)**
6. **(0)**
7. **(c)**
8. **(25)**
9. **(b)**
10. **(c)**
11. **(b, d)**
12. **(d)**
13. **(a, b)**

Hints and Solutions

1. (a, b, d)

In hard real time OS, a millisecond of delay can cause huge loss, the system where human lives and huge risks are involved are considered as the part of Hard RTOS. Therefore, satellite launch, missile control system, air traffic control, fire alarm system, heart pacemakers, etc. is Hard RTOS, whereas DVD player is an example of soft real time OS.

2. (7)

Privileged instructions are:

Set the value of the timer

Access I/O device

Switch from user to kernel mode

Switch from kernel to user mode

Modify entries in the device-status table

Clear memory

Turn off interrupts

Non- privileged instructions are:

Issue a trap instruction

Read the clock

3. (b, c)

Mode bit in User mode= 1

Mode bit in Kernel mode= 0.

So, User processes can only be executed when mode bit is 1. And, Kernel processes can only be executed when mode bit is 0.

Therefore, option B and C are correct.

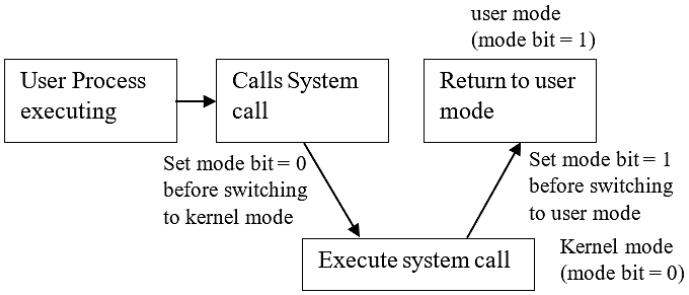
4. (a, b, c)

Mode shifting is required to switch from User mode to Kernel mode and from Kernel mode to User mode.

User mode (mode bit = 1) → Kernel mode (mode bit =0)

Kernel mode (mode bit =0) → User mode (mode bit =1).

Therefore, option A, B are correct.



An Interrupt is required to switch from user mode to kernel mode whereas a privileged instruction is required to switch from kernel mode to user mode. Therefore, option C is correct and option D is incorrect.

5. (b)

There is no ready state in Uni-programmed OS, single process is loaded from memory and directly executed on CPU.

6. (0)

The system is running in non-preemptive mode, so process A will continue its execution completely. While process A is executing, process B needs to wait in ready queue in the ready state (despite having higher priority).

(i) Process A will move from Ready to Running state- Process A is already running, so this transition is not possible in given scenario.

(ii) Process B will move from Ready to Running state- Since it is a non-pre-emptive system, process B have to wait till the time Process A finishes its execution.

(iii) Process A will be blocked till the time Process B is in running state- This is only possible if Process A

needs I/O service, but it is not given. So this scenario is also not possible

(iv) Process A will move to Ready state from running state till the time process B is in running state. This scenario is possible in preemptive system, but it is given that the system is non-preemptive. So not possible.

(v) Process B will move from Block state to Running state. Process B is waiting in ready queue, so this transition is also not possible.

Hence, none of the given scenarios are possible.

7. (c)

Long term scheduler is also known as a **job scheduler**. This scheduler regulates the program and select process from the queue and loads them into memory for execution. It also regulates the degree of multi-programming. It is either absent or minimal in a time-sharing system. Long term Scheduler works between New and ready state.

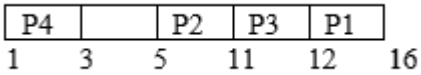
Medium Term scheduler is an important part of **swapping.** It handles processes moving to and from blocked, suspended states.

Short Term Scheduler is also known as CPU scheduler and it plays major role in time shared operating system. As it works between Running state and ready state.

So, option C is the correct answer.

8. (25)

Process	Arrival Time	Burst Time	Completion Time	Waiting time
P1	10	4	16	2
P2	5	6	11	0
P3	6	1	12	5
P4	1	2	3	0



Total context switches = 6 = X

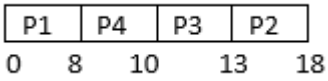
Total time CPU remain idle = 1 (unit between 0 and 1) + 2 (unit between 3 and 5) = 3 = Y

Total waiting time = 7

(X * Y) + Z = (6 * 3) + 7 = 25

9. (b)

Gantt Chart:



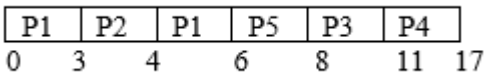
Process	Arrival Time	Burst Time	Completion Time	Turnaround Time	Waiting Time
P1	0	8	8	8	0
P2	4	5	18	14	9
P3	6	3	13	7	4
P4	8	2	10	2	0
				Average TT= 7.75	Average WT= 3.25

Difference between average turnaround time and average waiting time = 7.75- 3.25 = 4.5

10. (c)

2 ms

Gantt chart:



Process	Arrival Time	Burst Time	Completion Time	Turnaround Time	Waiting Time
P1	0	5 ms	6	6	1 ms
P2	3	1 ms	4	1	0 ms
P3	5	3 ms	11	6	3 ms
P4	7	6 ms	17	10	4 ms
P5	4	2 ms	8	4	2 ms

Average Waiting time = (1 + 3+ 4 + 2)/5 = 2

11. (b, d)

(a) SJF gives the optimal average turnaround time among all scheduling algorithms. Correct.

(b) FCFS may suffer from starvation. Incorrect, in FCFS there is no chance of starvation.

(c) SJF may suffer from starvation. Correct, SJF may suffer from starvation for processes with longer burst time.

(d) SRTF do not have starvation. Incorrect, SRTF may have starvation for processes with longer burst time.

12. (d)

The question is asking pre-emptive scheduling algorithm which suffers from convoy effect.

FCFS and SJF both are Non-preemptive in nature. So, A and B are incorrect.

SRTF is pre-emptive in nature but it does not suffer from convoy effect. So, C is also incorrect.

Although, FCFS suffers from convoy effect but it is non-preemptive in nature.

Therefore, option D is the correct answer.

13. (a, b)

Ready queue and Block queue are present on main memory. Device queue and Input/Job queue are present on disk.