

**Mid Semester Assignment**  
**Spring 2020**  
**Subject: Operating System Concepts**

*Section A*

**Name: Hidayat Khan**  
**Roll No: 17024**

Question No: 1 ( M - 1 )

*The hardware mechanism that enables a device to notify CPU is called an -----*

- ▶ **Interrupt**
- ▶ Signal
- ▶ Trap
- ▶ Process

Question No: 2 ( M - 1 )

*The section of the process control block comprises of page and segment tables*

- ▶ **Memory related information**
- ▶ Accounting information
- ▶ Register information
- ▶ Scheduling information

Question No: 3 ( M - 1 )

*The ----- system call suspends the calling process.*

- ▶ fork
- ▶ wait
- ▶ exec
- ▶ **exit**

Question No: 4 ( M - 1 )

*In -----addressing, the recipient is not required to name the sender.*

- ▶ Symmetric
- ▶ **Asymmetric**
- ▶ Both symmetric and asymmetric
- ▶ None of the given options

Question No: 5 ( M - 1 )

*----- command gives a snapshot of the current processes.*

- ▶ **ps**
- ▶ top
- ▶ who
- ▶ ls

Question No: 6 ( M - 1 )

*-----command to resume the execution of a suspended job in the foreground*

- ▶ **fg**
- ▶ bg
- ▶ jobs
- ▶ kill

Question No: 7 ( M - 1 )

**You can use the ----- command to display the status of suspended and background processes**

- ▶ fg
- ▶ bg
- ▶ **jobs**
- ▶ kill

Question No: 8 ( M - 1 )

**You can terminate a foreground process by pressing -----**

- ▶ <Ctrl-A>
- ▶ **<Ctrl-C>**
- ▶ <Ctrl-Z>
- ▶ None of the given options

Question No: 9 ( M - 1 )

**A time sharing system is**

- ▶ Multi-tasking
- ▶ Interactive
- ▶ Multi user
- ▶ **All of these**

Question No: 10 ( M - 1 )

**The main characteristic of a Real time system is**

- ▶ **Efficiency**
- ▶ Large Virtual Memory
- ▶ Large secondary storage device
- ▶ Usability

Question No: 11 ( M - 1 )

**Shared libraries and kernel modules are stored in \_\_\_\_\_ directory**

- ▶ /bin
- ▶ /dev
- ▶ /boot
- ▶ **/lib**

Question No: 12 ( M - 1 )

**\_\_\_\_\_ scheduler selects the process from the job pool and puts them in main memory.**

- ▶ **Long term**
- ▶ Short term
- ▶ Medium term
- ▶ Swapper

Question No: 13 ( M - 1 )

**In indirect inter process communication, a sender \_\_\_\_ mentions the name of the recipient.**

- ▶ do
- ▶ **do not**

Question No: 14 ( M - 1 )

**A \_\_\_\_\_ is an integer variable that, apart from initialization is accessible only through two standard atomic operations: wait and signal.**

- ▶ Semaphore
- ▶ Monitor
- ▶ Critical region
- ▶ Critical section

Question No: 15 ( M - 1 )

**A semaphore that causes Busy-Waiting is termed as \_\_\_\_\_.**

- ▶ Spinlock
- ▶ Monitor
- ▶ Critical region
- ▶ Critical section

Question No: 16 ( M - 1 )

**The execution of critical sections must NOT be mutually exclusive**

- ▶ True
- ▶ False

Question No: 17 ( M - 1 )

**The performance of the Round Robin algorithm does NOT depend heavily on the size of the time quantum.**

- ▶ True
- ▶ False

Question No: 18 ( M - 1 )

**The following requirement for solving critical section problems is known as \_\_\_\_\_.**

**“There exists a bound on the number of times that other processes are allowed to enter their critical sections after a process has made a request to enter its critical section and before that request is granted.”**

- ▶ Progress
- ▶ Bounded Waiting
- ▶ Mutual Exclusion
- ▶ Critical Region

Question No: 19 ( M - 1 )

**The critical section problem can be solved by the following except**

- ▶ Software based solution
- ▶ Firmware based solution
- ▶ Operating system based solution
- ▶ Hardware based solution

Question No: 20 ( M - 1 )

**\_\_\_\_\_ is also called Swapper.**

- ▶ Swap space
- ▶ Medium term scheduler
- ▶ Short term scheduler
- ▶ Long term scheduler

## Section B

Question No: 21 ( M - 2 )

**Write the formula/ procedure for calculating the waiting time in preemptive Shortest Job First scheduling.**

**Ans:**

In Preemptive SJF Scheduling, jobs are put into the ready queue as they come. A process with the shortest burst time begins execution. If a process with even a shorter burst time arrives, the current process is removed or preempted from execution, and the shorter job is allocated to the CPU cycle.

Consider the following five process:

Process Queue	Burst time	Arrival time
P1	6	2
P2	2	5
P3	8	1
P4	3	0
P5	4	4

**Step 0)** At time=0, P4 arrives and starts execution.

**Step 1)** At time= 1, Process P3 arrives. But, P4 has a shorter burst time. It will continue execution.

**Step 2)** At time = 2, process P1 arrives with burst time = 6. The burst time is more than that of P4. Hence, P4 will continue execution.

**Step 3)** At time = 3, process P4 will finish its execution. The burst time of P3 and P1 is compared. Process P1 is executed because its burst time is lower.

**Step 4)** At time = 4, process P5 will arrive. The burst time of P3, P5, and P1 is compared. Process P5 is executed because its burst time is lowest. Process P1 is preempted.

**Step 5)** At time = 5, process P2 will arrive. The burst time of P1, P2, P3, and P5 is compared. Process P2 is executed because its burst time is least. Process P5 is preempted.

**Step 6)** At time =6, P2 is executing.

**Step 7)** At time =7, P2 finishes its execution. The burst time of P1, P3, and P5 is compared. Process P5 is executed because its burst time is lesser.

**Step 8)** At time =10, P5 will finish its execution. The burst time of P1 and P3 is compared. Process P1 is executed because its burst time is less.

**Step 9)** At time =15, P1 finishes its execution. P3 is the only process left. It will start execution.

**Step 10)** At time =23, P3 finishes its execution.

**Step 11) Wait time**

$$P4 = 0 - 0 = 0$$

$$P1 = (3 - 2) + 6 = 7$$

$$P2 = 5 - 5 = 0$$

$$P5 = 4 - 4 + 2 = 2$$

$$P3 = 15 - 1 = 14$$

$$\text{Average Waiting Time} = \frac{0 + 7 + 0 + 2 + 14}{5} = \frac{23}{5} = 4.6$$

Question No: 22 ( M - 3 )

***If a process exits and there are still threads of that process running, will they continue to run?***

**Ans:**

No, threads of the process will no longer run once the process is terminated. Because all threads in a process share the same address space, all threads are suspended at the same time. Similarly, termination of a process terminates all threads within that process.

Question No: 23 ( M - 5 )

***Considering the Resource sharing feature of thread, what do you think is 'resource sharing' an advantage of a thread or disadvantage of a thread. Explain your answer briefly.***

**Ans:** It has both advantages and disadvantages.

**Advantages:**

1. **Responsiveness:**  
If the process is divided into multiple threads, if one thread completes its execution, then its output can be immediately returned.
2. **Resource sharing:**  
Resources like code, data, and files can be shared among all threads within a process. Stack and registers can't be shared among the threads. Each thread has its own stack and registers.
3. **Economy:**  
In OS, allocation of memory and resources for process creation seems costly. Because threads can distribute resources of any process to which they belong, it became more economical to create and develop context-switch threads.

**Disadvantages:**

1. Whereas resource sharing is one of the advantages of threads, it is also a disadvantage because proper synchronization is needed between threads for accessing the shared resources. E.g: data & file.
2. It is difficult to write, debug and maintain multi-threaded programmes for and average user. This is particularly true when it comes to writing code for synchronized access to shared resources.