

# OS Lab Viva Questions with Answers

## 1. What is an Operating System?

- An OS manages hardware and software resources, providing services for applications.

## 2. What are the main functions of an OS?

- Process management, memory management, file system management, device management.

## 3. What is a process? How is it different from a program?

- A process is a running program with resources allocated, while a program is static.

## 4. What are the different states of a process?

- New, Ready, Running, Waiting, and Terminated.

## 5. What is a thread? How does it differ from a process?

- A thread is a lightweight process that shares resources within a process.

## 6. What is multitasking in an OS?

- The ability of the OS to run multiple processes simultaneously.

## 7. What is the difference between multitasking and multiprocessing?

- Multitasking shares CPU time among processes, while multiprocessing runs processes on multiple CPUs.

## 8. What is a system call? Give an example.

- A system call allows programs to interact with the OS. Example: fork().

## 9. What is process scheduling? Name some scheduling algorithms.

- Process scheduling decides which process runs next. Algorithms: FCFS, SJF, RR, Priority Scheduling.

## 10. What is the difference between preemptive and non-preemptive scheduling?

- Preemptive allows process switching anytime, non-preemptive runs a process until completion.

## 11. What is a deadlock? What are the conditions for a deadlock to occur?

- Deadlock is when processes block each other. Conditions: Mutual Exclusion, Hold and Wait, No Preemption, Circular Wait.

## 12. How can deadlocks be prevented or avoided?

- Prevention removes one of the four conditions. Avoidance uses algorithms like the Banker's Algorithm.

## 13. What is virtual memory? How does it work?

- Virtual memory extends RAM using disk space, loading only needed parts into memory.

## 14. What is paging in OS?

- Paging divides memory into fixed-size blocks, reducing fragmentation.

## 15. What is the difference between paging and segmentation?

- Paging is fixed-size, segmentation is variable-size based on program structure.

## 16. What is a page fault? How is it handled?

- Occurs when a process accesses a page not in RAM. The OS loads it from disk.

## 17. What is the role of the kernel in an OS?

- The kernel is the core of the OS, managing resources and system calls.

## 18. What is the difference between a monolithic kernel and a microkernel?

- Monolithic includes all services, microkernel runs minimal services in kernel mode.

## 19. What is a semaphore? How is it used in process synchronization?

- A semaphore controls access to shared resources to prevent race conditions.

- 20. What is the difference between a binary semaphore and a counting semaphore?**  
- Binary is 0 or 1, used for mutual exclusion. Counting manages multiple resources.
- 21. What is a file system? What are its main functions?**  
- A file system organizes data storage. Functions: file creation, deletion, and access.
- 22. What is the difference between FAT and NTFS file systems?**  
- FAT is simpler but limited, NTFS supports security, compression, and larger files.
- 23. What is a context switch? Why is it important?**  
- A context switch saves a process state to switch execution to another process.
- 24. What is the purpose of the fork() system call in UNIX?**  
- Creates a new process identical to the parent.
- 25. What is the role of the shell in an OS?**  
- The shell interprets user commands and executes them via the OS.
- 26. What is CPU scheduling? Why is it needed?**  
- CPU scheduling decides process execution to optimize system performance.
- 27. What is the Round Robin scheduling algorithm?**  
- A time-sharing algorithm that assigns a fixed time slice to each process.
- 28. What is the First-Come-First-Serve (FCFS) scheduling algorithm?**  
- Executes processes in order of arrival.
- 29. What is the Shortest Job First (SJF) scheduling algorithm?**  
- Executes the shortest job first, reducing waiting time.
- 30. What is thrashing in OS?**  
- Excessive paging leading to performance degradation.
- 31. What is demand paging?**  
- Pages are loaded only when needed, reducing memory usage.
- 32. What is the difference between internal and external fragmentation?**  
- Internal: wasted space within allocated memory. External: scattered free memory.
- 33. What is a critical section in process synchronization?**  
- A code segment that accesses shared resources, requiring mutual exclusion.
- 34. What is the purpose of the exec() system call?**  
- Replaces the current process memory with a new program.
- 35. What is a zombie process?**  
- A terminated process whose exit status hasn't been collected by the parent.
- 36. What is the Banker's Algorithm?**  
- A deadlock avoidance method ensuring safe resource allocation.
- 37. What is a race condition?**  
- Unpredictable behavior when multiple processes access shared resources simultaneously.
- 38. What is inter-process communication (IPC)?**  
- Mechanisms for processes to communicate (e.g., pipes, shared memory).
- 39. What is the difference between a pipe and a FIFO?**  
- Pipe is for related processes, FIFO is named and can be used by unrelated processes.

**40. What is the role of swap space in an OS?**

- Swap space stores temporarily unused memory pages on disk.