**Operating Systems**

**Unit 1**

* [Introduction to os, os as a user interface](https://www.geeksforgeeks.org/introduction-of-operating-system-set-1/)
* [Types of operating systems](https://www.geeksforgeeks.org/types-of-operating-systems/?ref=lbp)
* [OS Services](https://www.javatpoint.com/operating-system-services)
* [Functions of OS](https://www.geeksforgeeks.org/functions-of-operating-system/?ref=lbp)
* [Different structures of OS](https://www.geeksforgeeks.org/different-approaches-or-structures-of-operating-systems/)
* [Microkernel OS](https://www.geeksforgeeks.org/microkernel-in-operating-systems/)
* [Monolithic kernel](https://www.geeksforgeeks.org/monolithic-kernel-and-key-differences-from-microkernel/)
* [System call](https://www.geeksforgeeks.org/introduction-of-system-call/)
* [Dual mode operation in OS](https://www.geeksforgeeks.org/dual-mode-operations-os/)
* [What happens when we turn on a computer](https://www.geeksforgeeks.org/what-happens-when-we-turn-on-computer/)
* [Boot Block](https://www.geeksforgeeks.org/boot-block-in-operating-system/?ref=lbp)

1. Terminal
2. Change the password in the file -> only allowed to system

10 tasks

2\*10

3\*1

5\*40

17th jan to 21st jan

**Interview Questions based on unit 1**

1. What do you understand about operating systems?
2. What is the dual mode operation in OS?
3. Difference between microkernel and monolithic kernel
4. What are system calls?
5. Types of system call
6. What is a boot block?
7. What is the structure of the OS?
8. What are the services provided by the OS?
9. What is the main purpose of an OS?
10. What functions does the OS perform?
11. What are the different types of OS?
12. What are real time operating systems?
13. What is kernel?
14. Difference between multiprogramming, multiprocessing and distributed OS
15. Functions of compiler, assembler and loader
16. What are interrupts?
17. Bootstrap program in OS
18. Name some operating systems

**UNIT 2**

* [Introduction to process management](https://www.geeksforgeeks.org/introduction-of-process-management/?ref=lbp)
* [States of a process](https://www.geeksforgeeks.org/states-of-a-process-in-operating-systems/?ref=lbp)
* [Process Schedulers](https://www.geeksforgeeks.org/process-schedulers-in-operating-system/?ref=lbp)
* [Process Control Block](https://www.geeksforgeeks.org/process-table-and-process-control-block-pcb/?ref=lbp)
* [Threads, multithreading,advantages of threads](https://www.geeksforgeeks.org/thread-in-operating-system/?ref=lbp)
* [Types of threads](https://www.geeksforgeeks.org/threads-and-its-types-in-operating-system/)
* [Multithreading models](https://www.geeksforgeeks.org/multi-threading-models-in-process-management/)
* [Diff between multiprogramming, multithreading and multiprocessing](https://www.geeksforgeeks.org/difference-between-multitasking-multithreading-and-multiprocessing/)

24th jan to 27th jan

**Interview Questions based on unit 2**

1. What are the different states of a process?
2. Difference between a program and a process.
3. What are different attributes of a process?
4. What is a CPU bound and I/O bound process? Are they similar? If not then how are they different?
5. What is context switching?
6. When does context switching occur?
7. What are different types of schedulers?
8. What do you understand by degree of multiprogramming?
9. What is a dispatcher? What functions does it perform?
10. What is a Process Control Block(PCB)?
11. What information does a PCB contain?
12. What is a thread?
13. How is a thread different from a process?
14. What is multithreading?
15. What are the advantages of threads over processes?
16. What are different types of threads?
17. Explain different multithreading models.
18. Difference between multithreading, multiprogramming and multiprocessing.
19. Difference between user level threads and kernel level threads.

**Unit 2 (contd…)**

* [Preemptive and Non preemptive scheduling](https://www.geeksforgeeks.org/preemptive-and-non-preemptive-scheduling/)
* [CPU Scheduling](https://www.geeksforgeeks.org/cpu-scheduling-in-operating-systems/)
* [Context Switching](https://www.javatpoint.com/what-is-the-context-switching-in-the-operating-system)
* [FCFS](https://www.guru99.com/fcfs-scheduling.html)
* [Convoy effect in FCFS](https://www.javatpoint.com/os-convoy-effect-in-fcfs)
* [SJF](https://www.guru99.com/shortest-job-first-sjf-scheduling.html)
* [Priority Scheduling](https://www.guru99.com/priority-scheduling-program.html)
* [Round Robin](https://www.guru99.com/round-robin-scheduling-example.html)
* [Starvation and Aging in OS](https://www.geeksforgeeks.org/starvation-and-aging-in-operating-systems/)

30th jan to 2nd Feb

**UNIT 3**

* [Introduction to process synchronization](https://www.geeksforgeeks.org/introduction-of-process-synchronization/)
* [Process Synchronization](https://www.geeksforgeeks.org/process-synchronization-set-2/)
* [Critical Section](https://www.geeksforgeeks.org/g-fact-70/)
* [Inter Process Communication](https://www.geeksforgeeks.org/inter-process-communication-ipc/)
* [Semaphores in OS](https://www.geeksforgeeks.org/semaphores-in-process-synchronization/)
* [Mutex vs. Semaphores](https://www.geeksforgeeks.org/mutex-vs-semaphore/)
* [Producer Consumer Problem](https://www.javatpoint.com/producer-consumer-problem-in-os)
* [Readers Writers Problem](https://www.javatpoint.com/os-readers-writers-problem)
* [Dining Philosopher problem](https://www.javatpoint.com/os-dining-philosophers-problem)

p1-> 1

p2-> 5→4→3

p3->2

p4->3

p5->1

p6->2

p7->5

p2->3

p7->5

6th Feb to 11th Feb

**Interview Questions based on unit 3**

1. What is an independent process and a co-dependent process?
2. How can processes communicate with each other?
3. What do you understand by the term critical section?
4. What is a race condition?
5. What requirements does the critical section need?
6. How does Peterman’s Solution solve the critical section problem?
7. How does Peterman’s Solution satisfy all the requirements of the critical section?
8. What hardware solutions can solve the critical section problem?
9. What is a mutex?
10. What are semaphores?
11. How do you define a semaphore?
12. Difference between mutex and semaphore.
13. What are binary semaphores?
14. What are counting semaphores?
15. Logic for Producer consumer problem.
16. Logic for all the cases of the Reader writer problem.
17. Logic of Dining Philosopher problem.
18. Solution for the Dining Philosopher problem.

**UNIT 4**

* [Introduction to deadlocks](https://www.geeksforgeeks.org/introduction-of-deadlock-in-operating-system/)
* [Conditions for deadlock](https://www.geeksforgeeks.org/conditions-for-deadlock-in-operating-system/?ref=rp)
* [Deadlock Prevention and Avoidance](https://www.geeksforgeeks.org/deadlock-prevention/)
* [Banker’s Algorithm](https://www.geeksforgeeks.org/bankers-algorithm-in-operating-system-2/)
* [Resource Allocation Graph (RAG)](https://www.geeksforgeeks.org/resource-allocation-graph-rag-in-operating-system/)
* [Deadlock detection and recovery](https://www.geeksforgeeks.org/deadlock-detection-recovery/)
* [Deadlock, Starvation, Livelock](https://www.geeksforgeeks.org/deadlock-starvation-and-livelock/)

Process->Requirement

p1-> R1

p2->R2

p3->R3

p4->R4

Process->Has

p1->R4

p2->R1

p3->R2

p4->R3

**Interview Questions based on unit 4**

1. What is a deadlock?
2. Difference between deadlock, starvation and livelock.
3. What are the necessary conditions for deadlock to occur?
4. What are the approaches to handle deadlock?
5. How will you prevent a deadlock?
6. How to avoid deadlock in a system?
7. Is Banker’s algorithm a deadlock prevention technique or a deadlock avoidance technique?
8. How does Banker's algorithm avoid deadlock?
9. How can a system detect deadlock?
10. Can a system recover from a deadlock?
11. How can a system recover from a deadlock?
12. Difference between deadlock prevention and avoidance.
13. Practice Banker’s algorithm.

**UNIT 5**

* [Introduction to memory and memory units](https://www.geeksforgeeks.org/introduction-to-memory-and-memory-units/)
* [RAM and ROM](https://www.geeksforgeeks.org/random-access-memory-ram-and-read-only-memory-rom/)
* [Memory Hierarchy](https://www.geeksforgeeks.org/memory-hierarchy-design-and-its-characteristics/)
* [Cache memory](https://www.geeksforgeeks.org/cache-memory/)
* [Secondary memory](https://www.geeksforgeeks.org/secondary-memory/)
* [Basis of memory](https://www.geeksforgeeks.org/requirements-of-memory-management-system/)
* [Logical and physical address in OS](https://www.geeksforgeeks.org/logical-and-physical-address-in-operating-system/)
* [Memory allocation techniques in OS](https://www.geeksforgeeks.org/memory-allocation-techniques-mapping-virtual-addresses-to-physical-addresses/)
* [Contiguous Memory Allocation](https://www.geeksforgeeks.org/implementation-of-contiguous-memory-management-techniques/)
* [Non Contiguous Memory Allocation](https://www.geeksforgeeks.org/non-contiguous-allocation-in-operating-system/)
* [Partition allocation methods](https://www.geeksforgeeks.org/partition-allocation-methods-in-memory-management/)
* [First Fit](https://www.geeksforgeeks.org/first-fit-allocation-in-operating-systems/)
* [Best Fit](https://www.geeksforgeeks.org/best-fit-allocation-in-operating-system/)
* [Worst Fit](https://www.geeksforgeeks.org/worst-fit-allocation-in-operating-systems/)
* [Next Fit](https://www.geeksforgeeks.org/program-for-next-fit-algorithm-in-memory-management/)
* [Fixed partitioning in OS](https://www.geeksforgeeks.org/fixed-or-static-partitioning-in-operating-system/)
* [Variable Partitioning in OS](https://www.geeksforgeeks.org/variable-or-dynamic-partitioning-in-operating-system/)
* [Fragmentation in OS](https://www.javatpoint.com/fragmentation-in-operating-system)
* [Difference between Internal and External Fragmentation](https://www.geeksforgeeks.org/difference-between-internal-and-external-fragmentation/)
* [Compaction in OS](https://www.geeksforgeeks.org/compaction-in-operating-system/)
* [Segmentation](https://www.geeksforgeeks.org/segmentation-in-operating-system/)
* [Paging in OS](https://www.geeksforgeeks.org/paging-in-operating-system/)
* [Page Fault and Page Hit](https://t4tutorials.com/difference-between-page-fault-page-hit-and-page-miss-examples-diagram/)
* [Page Replacement Algorithms](https://www.geeksforgeeks.org/page-replacement-algorithms-in-operating-systems/) (Refer the programs and implementation of these algorithms)
* [Belady's Anomaly in Page Replacement Algorithm](https://www.geeksforgeeks.org/beladys-anomaly-in-page-replacement-algorithms/)
* [Virtual Memory, Demand Paging, Swapping, Thrashing](https://www.geeksforgeeks.org/virtual-memory-in-operating-system/)

Secondary memory-> main memory-> cache-> registers

Memory-> 7,2,1,3,2,1,5,8,4,4,9

| 7 | 7 | 7 | 3 | 3 |
| --- | --- | --- | --- | --- |
|  | 2 | 2 | 2 | **2** |
|  |  | 1 | 1 | 1 |

F F F F H

Mar 12 to Mar 19

**Interview Questions based on unit 5**

1. Difference between primary and secondary memory.
2. Difference between RAM and ROM.
3. Is ROM readable or can we edit the ROM memory?
4. What is the general memory hierarchy that is followed in the computer systems?
5. Difference between primary memory and cache memory.
6. Difference between logical and physical address in OS.
7. What are the different memory allocation techniques in OS?
8. What is contiguous memory allocation in OS?
9. What is non-contiguous memory allocation in OS?
10. What are different partitioning methods in OS?
11. What is fixed partitioning and its pros and cons?
12. What is variable partitioning and its pros and cons?
13. What is fragmentation?
14. What is internal fragmentation and which type of partitioning causes this type of fragmentation?
15. How can the problem of internal fragmentation be solved?
16. What is external fragmentation and which type of partitioning causes this type of fragmentation?
17. How can the problem of external fragmentation be solved?
18. What is compaction?
19. Difference between internal and external fragmentation.
20. What is segmentation in OS?
21. What is a page table?
22. What are page faults and page hits and when do they occur?
23. For a system to be efficient do we want more page faults or more page hits?
24. What are different page replacement algorithms and how do they work?(FIFO, LRU, Optimal)
25. Programs of each page replacement algorithm(Refer the part of implementation with queue or stack)
26. Which is the best page replacement algorithm among FIFO, LRU and Optimal. And why?
27. What is Belady’s Anomaly and which algorithm faces this?
28. What is virtual memory?
29. What is demand paging?
30. What is swapping and why is it done?
31. What is the problem of thrashing?
32. When does a system face thrashing?
33. How to solve the problem of thrashing?

**Unit 6**

* [File System in OS, directory structure, file allocation methods](https://www.geeksforgeeks.org/file-systems-in-operating-system/)
* [Path Name in OS](https://www.geeksforgeeks.org/path-name-in-file-directory/)
* [Unix File System in OS](https://www.geeksforgeeks.org/unix-file-system/)
* [Structure of directory in OS](https://www.geeksforgeeks.org/structures-of-directory-in-operating-system/)
* [File Access Methods in OS](https://www.geeksforgeeks.org/file-access-methods-in-operating-system/)
* [File allocation methods](https://www.geeksforgeeks.org/file-allocation-methods/)
* [What is spooling](https://www.geeksforgeeks.org/what-exactly-spooling-is-all-about/)
* [Difference between Spooling and Buffering](https://www.geeksforgeeks.org/difference-between-spooling-and-buffering/?ref=lbp)
* [Free space management in OS](https://www.geeksforgeeks.org/free-space-management-in-operating-system/)
* [Primary and Secondary memory](https://www.geeksforgeeks.org/secondary-memory/)
* [Hard Disk Drive Secondary memory](https://www.geeksforgeeks.org/hard-disk-drive-hdd-secondary-memory/)
* [Disk Scheduling algorithms](https://www.geeksforgeeks.org/disk-scheduling-algorithms/) Go through the programs of these scheduling algorithms

Mar 23 to 28 Mar

**Interview Questions based on unit 6**

1. What is a file?
2. Where is the file stored?
3. What do you mean by file system in OS?
4. What are different types of extension and how can we save a file in that extension?
5. Is mentioning an extension to a file important?
6. What are different attributes of a file?
7. What are the different ways in which we can give path in OS?
8. When to use absolute path and relative path?
9. What is a directory?
10. What are different directory structures followed in OS?
11. Advantages and disadvantages of different directory structures.
12. What are different file access methods?
13. Advantages and disadvantages of different file access methods.
14. What are different file allocation methods?
15. Advantages and disadvantages of different file allocation methods.
16. What is Spooling?
17. What is buffering?
18. Difference between spooling and buffering.
19. How is free space managed by the OS?
20. What are the different techniques of managing free space?
21. Advantages and disadvantages of different free space management techniques.
22. What are different disk scheduling algorithms and how do they work? How is their seek time calculated?
23. Difference between different disk scheduling algorithms.