Question Bank - Operating Systems (CA 503 MJ)

F.Y.M.Sc. Computer Application (2023 Pattern)

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1 MARK QUESTIONS

Unit I - Introduction

1. Define Operating System.
2. What is a process?
3. Define system call.
4. What is PCB?
5. List any two OS services.
6. What is user interface?
7. Define process state.
8. What is kernel?
9. What is shell in Linux?
10. Define multitasking.

Unit II - File System

11. What is a file?
12. Define file attribute.
13. What is directory?
14. What is mounting?
15. Define file extension.
16. What is root directory?
17. What is file descriptor?
18. Define file allocation.
19. What is inode?
20. What is file system?

Unit III - Process Scheduling and Multithreading

21. What is CPU scheduling?
22. Define dispatcher.
23. What is context switch?

24. What is thread?
25. Define burst time.
26. What is arrival time?
27. What is waiting time?
28. Define turnaround time.
29. What is response time?
30. What is throughput?

Unit IV - Deadlock

31. What is a deadlock?
32. Define starvation.
33. What is mutual exclusion?
34. Define hold and wait.
35. What is circular wait?
36. What is no preemption?
37. Define a safe state.
38. What is an unsafe state?
39. What is a resource allocation graph?
40. Define banker's algorithm.

Unit V - Memory Management

41. What is paging?
42. Define segmentation.
43. What is swapping?
44. What is virtual memory?
45. Define fragmentation.
46. What is the logical address?
47. What is a physical address?
48. Define MMU.
49. What is the page fault?
50. What is TLB?

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2 MARK QUESTIONS

Unit I - Introduction

1. List any four services provided by the OS to users.
2. Explain the concept of system calls with examples.
3. What is a Process Control Block? List its main components.
4. Differentiate between user mode and kernel mode.

5. Write the features of the Linux operating system.
6. Explain the role of shell in Linux OS.
7. What is the difference between program and process?
8. Define process states and draw the process state diagram.
9. Explain the concept of layered architecture in OS.
10. What are the different types of operating systems?

Unit II - File System

11. List different file operations with brief explanation.
12. Explain file attributes in detail.
13. What is the difference between sequential and direct access methods?
14. Explain single-level directory structure.
15. What is the difference between absolute and relative path?
16. Explain the concept of file allocation methods.
17. What is a Virtual File System (VFS)?
18. Explain partitions and mounting in file systems.
19. Differentiate between file and directory.
20. What are the advantages of tree-structured directories?

Unit III - Process Scheduling and Multithreading

21. Define CPU-I/O burst cycle.
22. Explain preemptive and non-preemptive scheduling.
23. What is the role of dispatchers in CPU scheduling?
24. List different types of schedulers.
25. Explain the concept of multithreading.
26. What are the advantages of multithreading?
27. Differentiate between process and thread.
28. Explain user-level and kernel-level threads.
29. What is inter-process communication?
30. Explain the concept of scheduling queues.

Unit IV - Deadlock

31. State four necessary conditions for deadlock.
32. What is the Resource Allocation Graph? How is it used?
33. Explain safe and unsafe states in deadlock avoidance.
34. What is the difference between deadlock prevention and avoidance?
35. Explain process termination method for deadlock recovery.
36. What is resource preemption in deadlock recovery?
37. Explain circular wait conditions with examples.
38. What is banker's algorithm used for?
39. Define hold and wait conditions.

40. Explain mutual exclusion condition.

Unit V - Memory Management

41. Explain static and dynamic loading.
42. What is the difference between static and dynamic linking?
43. Define logical and physical address space.
44. Explain the concept of swapping with benefits.
45. What is internal and external fragmentation?
46. Explain memory allocation techniques: Best Fit, First Fit, Worst Fit.
47. What is the use of paging in memory management?
48. Define segmentation and its advantages.
49. Explain the concept of virtual memory.
50. What is a Memory Management Unit (MMU)?

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4 MARK QUESTIONS

Unit I - Introduction

1. Explain the architecture of Linux Operating System with a neat diagram.
2. Describe different services provided by the Operating System to users in detail.
3. What is a Process? Explain all states of a process with a state transition diagram.
4. Explain the concept of system calls. Describe different types of system calls.
5. Write advantages and disadvantages of Linux Operating System.
6. Explain the layered approach in operating system design.
7. Describe the concept of virtual machines and their advantages.
8. Explain process creation and termination in detail.
9. What is kernel? Explain different types of kernels.
10. Describe the boot process of an operating system.

Unit II - File System

11. Explain file system structure and implementation in detail.
12. Describe various file allocation methods: Contiguous, Linked, and Indexed.
13. What are the various file operations? Explain each in detail.
14. Explain different directory structures: Single-level, Two-level, Tree-structured.
15. Describe free space management techniques in file systems.
16. Explain file access methods: Sequential, Direct, and Index Sequential.
17. What is file protection? Explain different protection mechanisms.
18. Describe Virtual File System (VFS) and its advantages.
19. Explain the concept of file sharing and its implementation.
20. Compare and contrast different file allocation methods.

Unit III - Process Scheduling and Multithreading

21. Explain different CPU scheduling algorithms: FCFS, SJF, Priority, Round Robin.
22. What is multithreading? Explain multithreading models in detail.
23. Describe inter-process communication methods: Shared memory and Message passing.
24. Explain multilevel queue scheduling and multilevel feedback queue scheduling.
25. What are the advantages and disadvantages of FCFS scheduling algorithm?
26. Describe the concept of process synchronization and critical section.
27. Explain thread creation methods and thread lifecycle.
28. Compare and contrast processes and threads.
29. Describe different scheduling criteria used in CPU scheduling.
30. Explain the concept of context switching and its overhead.

Unit IV - Deadlock

31. What is Deadlock? Write all necessary conditions for deadlock occurrence.
32. Explain deadlock prevention methods in detail.
33. Describe deadlock avoidance using banker's algorithm with example.
34. Explain deadlock detection methods and recovery techniques.
35. What is Resource Allocation Graph? Explain with example.
36. Compare deadlock prevention, avoidance, and detection methods.
37. Explain the dining philosophers problem and its solution.
38. Describe the concept of safe and unsafe states with examples.
39. What are the methods for handling deadlocks? Explain each.
40. Explain the wait-for graph method for deadlock detection.

Unit V - Memory Management

41. Explain paging technique in memory management with advantages.
42. Describe segmentation technique and compare it with paging.
43. What is virtual memory? Explain its implementation and advantages.
44. Explain different memory allocation techniques and their comparison.
45. Describe the concept of swapping and its benefits.
46. What is demand paging? Explain page replacement algorithms.
47. Explain the concept of thrashing and its solutions.
48. Describe memory protection mechanisms in operating systems.
49. What is Translation Lookaside Buffer (TLB)? Explain its working.
50. Explain the concept of memory-mapped files and their advantages.

NUMERICAL PROBLEMS (2-4 MARKS)

Process Scheduling

1. Calculate average waiting time and turnaround time for FCFS scheduling.
2. Solve SJF scheduling problems (both preemptive and non-preemptive).
3. Calculate response time and waiting time for Round Robin scheduling.
4. Solve priority scheduling problems with different scenarios.
5. Compare performance of different scheduling algorithms.

Deadlock

11. Banker's algorithm implementation problems.
12. Resource allocation graph analysis.
13. Safe sequence determination problems.
14. Deadlock detection using wait-for graphs.
15. Resource need matrix calculations.
