



Dezyne École College

Bachelor of Computer Application (B.C.A.) First Year-1st Semester Operating Systems

University Exam Probable Questions

UNIT 1

Short Questions (10)

1. What are the primary goals of an operating system? Name any four main objectives.
2. Differentiate between system calls and system programs with examples.
3. What is the difference between multiprogramming and multiprocessing systems?
4. Define critical section and critical region in the context of concurrent programming.
5. List three scheduling criteria used to evaluate CPU scheduling algorithms.
6. What is the difference between threads and processes in terms of resource sharing?
7. Name the three types of schedulers based on scheduling time frame and their primary functions.
8. What is a semaphore and what are its two main operations?
9. Define real-time systems and mention two types of real-time systems.
10. What is inter-process communication (IPC) and why is it necessary?

Long Questions

1. Define operating systems. Explain their main goals: resource management, user interface, and security. Describe OS as resource allocator and extended machine.
2. Compare batch processing, multiprogramming, time-sharing, distributed, and real-time systems. State their design principles and applications.
3. Explain system calls and their interface with kernel. Describe execution mechanism and parameter passing. Give examples of process control, file management, and device management calls.
4. Define processes, process states, and PCB. Explain process creation, termination, and state transitions. Describe parent-child relationships.

5. Explain threads vs processes. Compare user-level and kernel-level threads. Describe multithreading models (many-to-one, one-to-one, many-to-many).
 6. Explain scheduling criteria (CPU utilization, throughput, turnaround time, waiting time, response time). Describe long-term, medium-term, and short-term schedulers.
 7. Compare FCFS, SJF, Priority, Round Robin, and Multilevel Queue scheduling. Calculate average waiting and turnaround times with examples.
 8. Explain critical section problem and race conditions. Describe Peterson's solution and hardware solutions (test-and-set, compare-and-swap).
 9. Compare shared memory, message passing, pipes, and sockets. Explain producer-consumer problem and its solutions.
 10. Explain semaphores (binary and counting) and monitors. Describe wait/signal operations and condition variables. Solve classical problems: producer-consumer, readers-writers, dining philosophers.
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UNIT 2

Short Questions (10)

1. What is the difference between logical and physical addresses?
2. Define swapping in the context of memory management.
3. What are the main advantages of paging over contiguous allocation?
4. List the four necessary conditions for deadlock occurrence.
5. What is thrashing in virtual memory systems?
6. Differentiate between hard links and soft links.
7. What information is stored in an inode?
8. Name three page replacement algorithms.
9. What is the purpose of the dup2() system call?
10. Define demand paging and its primary benefit.

Long Questions (10)

1. Compare segmentation and paging memory schemes. Explain advantages/disadvantages of each. Describe how segmentation with paging combines both benefits.
2. Explain virtual memory implementation using paging. Describe page tables, TLB, and address translation steps. State benefits and drawbacks.

3. Compare deadlock prevention, avoidance, detection, and recovery. Explain Banker's algorithm. Discuss trade-offs in performance and resource utilization.
4. Compare FIFO, LRU, Optimal, and Clock algorithms. Explain Belady's anomaly. Discuss performance characteristics and implementation challenges.
5. Define thrashing and its causes. Explain impact on performance. Describe prevention strategies using working set model and page fault frequency.
6. Explain buddy system and slab allocation. Describe why kernel allocation differs from user space. Discuss fragmentation solutions.
7. Explain inode-based file system organization. Describe inode structure, file metadata storage, and relationship with directory entries.
8. Describe open(), create(), read(), write(), close(), lseek() system calls. Explain file descriptors and kernel file descriptor tables.
9. Explain chmod(), chown(), and related system calls. Describe octal notation, special permissions (setuid, setgid, sticky bit), and security implications.
10. Compare segmentation and paging for virtual memory. Discuss external/internal fragmentation, translation overhead, memory protection, and hybrid approaches.

UNIT 3

Short Questions (10)

1. What is the difference between mkdir() and rmdir() system calls? What conditions must be met for rmdir() to succeed?
2. Explain the purpose of the getcwd() function and its return value.
3. What is the difference between fork() and vfork() system calls?
4. List three functions used for directory scanning and briefly describe their purpose.
5. What is the role of environment variables in process execution? Name two functions to manipulate them.
6. Define shell metacharacters and provide three examples.
7. What is the purpose of the wait() and waitpid() system calls?
8. Explain the concept of "here documents" in shell scripting.
9. What is the difference between hard quotes and soft quotes in shell scripting?
10. Name three members of the exec family of functions and their primary difference.

Long Questions (10)

1. What are `mkdir()`, `rmdir()`, `chdir()`, and `getcwd()` functions? How do you create, remove, and navigate directories in C? Write a simple program that creates a folder, goes into it, and prints the current location.
2. How do you list files in a directory using C? Explain `opendir()`, `readdir()`, and `closedir()` functions with simple examples. Write a basic program that shows all files in a folder.
3. What are environment variables like `PATH` and `HOME`? How do `getenv()` and `setenv()` work? Write a simple program that reads and sets environment variables.
4. What is `fork()` and how does it create a copy of your program? What's the difference between `fork()` and `vfork()`? Write a basic program where parent and child processes print different messages.
5. How do `fork()`, `exit()`, and `wait()` work together? What are zombie processes? Write a simple program where a parent waits for its child to finish.
6. How do you run another program from your C program? Explain basic `exec` functions like `execl()` and `execv()`. Write a program that runs the "ls" command.
7. What is a shell script? How do you create variables and run commands? Show simple examples of setting variables and using command output in scripts.
8. How do pipes (`|`) and redirection (`>`, `<`) work? What are wildcards (`*`, `?`) and quotes? Write simple examples of connecting commands and using file patterns.
9. How do you write if-statements and loops in shell scripts? What is the test command? Write basic scripts with conditions and simple loops.
10. How do you handle errors in shell scripts? What are basic debugging techniques? Write a simple script that checks for errors and shows helpful messages.



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**Bachelor of Computer Applications (BCA)
(Part-I) (Semester-I) Examination , 2024
(Held in 2025)
BCA-104
Operating Systems**

*Duration of Examination: 3 Hours**परीक्षा की अवधि: 3 घण्टा**Max. Marks: 70**पूर्णांक: 70**Instructions to the Candidates:**परीक्षार्थी के लिए निर्देश:-**Note:- The question paper is divided into 02 Parts: Part - A & Part-B.***Part-A***Will consist of 10 compulsory questions. Answer to each question shall be limited up to 50 words. Each question will carry 02 marks. Total 20 Marks.**(Marks-10 × 2 = 20)***Part-B***Will consist of 10 questions. Student will have to answer 05 questions, selecting At least one questions from each unit. The answer to each question shall be limited upto 400 words. Each question carries 10 marks. Total 50 Marks.**(Marks-5 × 10 = 50)*

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Part-A

1. Explain the difference between batch processing and time-sharing operating systems
2. A process has a logical address of 0x3F2 and is located in page 2. Calculate its physical address if the page size is 256 bytes.
3. What is a critical section?
4. State two advantages of multithreading.
5. For a system with 4 frames and the following reference string, calculate the number of page faults using the FIFO page replacement algorithm:
Reference string: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0
6. Mention the purpose of the chmod command in file systems.
7. State the role of mkdir and rmdir commands.
8. What is the use of the getenv function?
9. Explain the role of pipes in shell programming.



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10. Define file metadata and its importance.

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PART-B

11. Given 3 frames and the reference string: 2, 3, 2, 1, 5, 2, 4, 5, 3, 1, calculate the number of page faults using the LRU (Least Recently Used) page replacement algorithm. 7

12. Discuss the following process management system calls:

(a) fork (b) exec (c) wait

13. Calculate the average turnaround time and waiting time for the following processes using the SJF: (Shortest Job First) scheduling algorithm:

Processes: P1, P2, P3, P4

Arrival Times: 0, 1, 2, 3 ms

Burst Times: 5, 3, 8, 6 ms

TT - 1.75

WT - 5.25

14. Write a shell script to:

(a) Display the number of files in the current directory. is number

(b) Check if a given number is even or odd.

15. A system uses a virtual memory with a page size of 4 KB. Translate the virtual address 0x12F4 to the physical address assuming it maps to frame 5.

16. (a) Explain the significance of quoting and test commands in shell scripting.

(b) Provide an example of a shell script using control structures (if—else, for, or while).

17. Describe the difference between paging and segmentation with suitable examples. Include a numerical to show how segmentation divides a logical address. 420

18. Explain the concept of semaphores with an example where semaphores are used to solve the producer-consumer problem.

19. Explain thrashing in the context of memory management and provide an example calculation of CPU utilization for given processes under high thrashing conditions.

20. (a) Discuss the goals and functions of an operating system.

(b) Explain the differences between distributed systems and real-time systems.

Total No. of Pages: 02

[Total No. of Questions: 18]



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BCA (Part-III) Examination, 2024
Paper - BCA - 306
Open Source Technology & Operating Systems

Duration of Examination: 3 Hours

परीक्षा की अवधि: 3 घण्टा

Max. Marks: 50

पूर्णांक: 50

Instructions to the Candidates:परीक्षार्थी के लिए निर्देश:-**Part-A (Compulsory)**

Answer all ten questions (upto 20 words each). Each question carries equal marks.

(Marks-15)

Part-B (Compulsory)

Answer all five questions (upto 50 words each). Each question carries equal marks.

(Marks-15)

Part-C

Answer any three questions (upto 400 words each). Selecting one question from each unit.

Three questions of 7, 7 & 6 marks.

(Marks-20)

Part-A

- 1- What is an operating system?
- 2- What is mean by booting?
- 3- What is the ready state of a process?
- 4- What is Inter process communication?
- 5- What is address binding?
- 6- Define Dynamic loading?
- 7- What is valid state of a thread?
- 8- Which routing technique is used in a distributed system?
- 9- What is a shell script?
- 10- What is a superblock in shell scripting?

Part-B

- 11- What is the purpose of System calls?
- 12- What is scheduling? What is the need of it?
- 13- Why segmentation is required?
- 14- What are the various stages of a linux process it passes through?
- 15- Explain the different types of variables used in shell script?

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Part-C

Unit-I

- 16- Define multiprocessor system? Explain the difference between symmetric and A symmetric multiprocessing?

OR

What is process? What are the states of a process? Explain.

Unit-II

What is Dead Lock? What are the necessary conditons for Dead Locks?

OR

Discuss about the distributed system. Explain its structure?

Unit-III

Write short notes on:-

(a) Paging (b) Segmentation (c) Vi Editor

OR

What is Array? How to declare array in shell scripting? Explain with example?

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Open Source Technology & Operating System.



What is Thread ? Explain its advantage. — 3

How will you declare and define an array in linux. Give eg. — 3

What is block and inodes in linux ?
Give details. — 3

How Operating System acts as a Resource Manager. — 3

Explain Architecture of linux with its components. — 3

What do you mean by Process Scheduling?
Explain long, medium and short term scheduling with example. — 5

What RR scheduling Algorithm? Explain it with a suitable example. — 5

How we can translate characters in linux. Explain with example 4 types of translating commands. —

How operating system acts as a resource manager and an extended virtual machine — 3

What is the advantage of using RR scheduling algorithm, Illustrate its working with the help of an example, Find out Average waiting and Turnaround Time. — 5

Explain the states of a process with the help of a diagram, Briefly explain each state. — 5

How we can track a process, Explain this concept with various information it can track. — 4

Explain any 2 classes of operating system briefly —