

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2388
Unique Paper Code : 2342572401
Name of the Paper : Operating Systems
Name of the Course : B.Sc. (Programme)
Semester : IV

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Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.

SECTION A

- Q1a. Explain Operating System as Resource Manager. 3
b. Discuss reasons for process termination. 3
c. Why is dual-mode operation essential for OS security? 2
d. Why is context switching considered overhead? 2
e. How does multithreading overcome the limitations of single-threaded execution? 2
f. Can deadlock occur with only one process? Explain logically. 2
g. What is the role of the Memory Management Unit (MMU)? 2
h. How does swapping improve CPU utilization? 2
i. Name system call that can be used by a parent process to determine the termination of child process? 3
j. Under what circumstances does page fault occur? 3
k. Differentiate between: 6
(i) multi-tasking and multi-user system
(ii) user mode and kernel mode
(iii) time sharing and multiprogramming operating system

SECTION B

- Q2 a. Explain the structure of a disk with the help of a diagram. 4
b. Explain the contiguous memory allocation and non-contiguous memory allocation with suitable diagram. Why is contiguous allocation faster than non-contiguous allocation? 5
c. Disk requests come to the disk driver for cylinders 4 15, 25, 10, 6, 45, 15, 37 in that order. 6
A seek operation takes 10 milliseconds to move the disk arm to a cylinder.
How much seek time is needed for :
(1) First Come First Serve
(2) SSTF
(3) Elevator algorithm. (Moving upward)
Note: In all the cases the arm is initially at cylinder 25
- Q3 a. What is Dead lock? Explain four necessary conditions for dead lock to occur with suitable example. Describe the different methods for 10

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prevention and avoidance of dead lock. Consider a system having two processes and three resources. Each process needs a maximum of two resources. Draw resource allocation graph for the same. Is a deadlock possible?

- b. What do you understand by demand paging? Explain its working. 5

- Q4 a. Apply first-fit, best-fit, worst-fit for: 6
Memory blocks: 100KB, 500KB, 200KB, 300KB, 600KB
Processes: 212KB, 417KB, 112KB, 426KB
Calculate remaining memory after allocation using each strategy.

- b. Explain File system in Operating System. State and explain any two file allocation methods. 6

- c. Consider a machine with 64 MB physical memory and a 32bit virtual address space. If the page size is 4 KB, what is the approximate size of the page table? 3

- Q5 a. Consider the following: 9

Process	Arrival Time (ms)	Burst Time (ms)
P1	0	10
P2	1	4
P3	2	5

Find the average waiting time and the turn-around time for the following process scheduling algorithms:

- (i) FCFS
- (ii) SJF
- (iii) Round Robin. (Time Quantum = 5 ms)

- b. (i) Explain the concept of paging with a Translation Lookaside Buffer (TLB) and illustrate it with a suitable diagram. 6

- Q6 a. Consider the following page reference string how many page faults will occur using LRU and optimal page replacement scheme. Compare the results. 1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9, 5, 4, 5, 4, 2. The number of page frames = 3. 6

- b. Describe the critical section problem with suitable example. What are the requirements of solution the critical-section problem? 5

- c. Explain the performance criteria for process scheduling algorithms. 4

- Q7 a. Explain the Layered System Structure of Operating System, with one advantage and one disadvantage. 4

- b. Explain why context switching is necessary in a multitasking system. 3

- c. Write short notes on the following (any four): 8

- (i) Process State
- (ii) Process Control Block
- (iii) Swapping
- (iv) Dispatch latency
- (v) File operations