

Operating Systems (End Sem)

(a) Explain why spinlocks are not appropriate for single-processor systems yet are often used in multiprocessor systems. What are their advantages and how can we overcome the need for spinlocks?

(b) Consider a system consisting of 6 disk drives with 'n' processes competing for them. Each process may need 2 drives. For which value of 'n' is the system deadlock free? Elaborate your answer. Also, is it possible to have a deadlock involving only one process? Justify your answer with the help of relevant example.

(c) The following set of processes with the length of CPU burst time (in milliseconds) is given: Assume each context switch takes 1 unit of time.

Process	Arrival Time	Burst Time	Priority
P1	0	9	3
P2	1	1	1
P3	2	2	3
P4	3	4	4
P5	4	5	2

Draw the Gantt chart & calculate the average waiting time & average turnaround time for the following scheduling algorithms:

i) SJF ii) SRTF iii) Round Robin (Time Quantum=3ms) iv) Non Preemptive Priority scheduling v) Preemptive Priority Scheduling

(a) The reference string is: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3 & there are 3 frames allocated to a process. Calculate the number of page faults for the following page replacement algorithms. Assume that initially, page numbers 1, 2 & 3 (in this order) are already loaded in the three frames.

(i) FIFO (ii) LRU (iii) Optimal (iv) LFU (v) MFU

(b) What is a directory structure? What are the different ways of implementing a directory? Explain the various allocation schemes that exist for allocating secondary storage to files.

(Please write your Enrollment Number)

Enrollment No. _____

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END TERM EXAMINATION
(May, 2018)

Subject Code: MCA 106

Subject: Operating System

Time: 3 Hours

Maximum Marks: 60

Note: Q1 is compulsory. Attempt one question each from the Units I, II, III & IV.

(4x5=20)

Q1.

- What is Access Matrix? Where and how is it used?
- Write a note on Linux Operating system design principles.
- Explain why page size is always power of 2. Define Logical address and Physical address. Consider a logical address space of eight pages of 1024 words each mapped onto a physical memory of 32 frames. Find how many bits are there in the logical address and physical address.
- Give the various factors for evaluation of CPU scheduling algorithms.

UNIT-I

(5,5)

Q2.

- Explain System calls in detail. Give different types of system calls.
- Consider the following scenario of a system with 5 processes

Process	Burst Time	Priority
P1	8	4
P2	6	1
P3	1	2
P4	9	2
P5	3	3

Draw the Gantt Chart and calculate the average waiting time and average turnaround time using SJF (with pre-emption) and Round Robin with time slice = 2.

(5,5)

Q3.

- What is a thread and what is multithreading? Give the benefits of multithreading.
- Define a process. Explain the various operations on processes.

UNIT-II

(5,5)

Q4.

- What are concurrent processes? Discuss the problems related to concurrent processes.
- Consider the following page-reference string: 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6. How many page faults would occur for the following replacement algorithms using three frames?
 - LRU replacement
 - Optimal replacement

Q5. Explain semaphores. Give and explain the solution to producer consumer problem using semaphore.

(10)

UNIT-III

Q6.

- Define the terms: Buffering, Dedicated devices, Shared devices and Virtual Devices.
- What are Bad blocks? Explain how they can be handled?

(5,5)

Q7. Suppose that a disk drive has 200 cylinders. The drive is currently serving a request at cylinder 63. The queue of pending requests is 100, 175, 51, 133, 8, 140, 73, 77. Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk-scheduling algorithms?

(10)

- SSTF
- Elevator
- LOOK
- C-LOOK

UNIT-IV

Q8.

- Explain the File system structure in detail.
- What is User Authentication? Explain the various User Authentication schemes.

(5,5)

Q9.

- What is a virus? Explain various stages of a virus and different types of Virus.
- Write a short note on design principles and architecture of Windows XP.

(5,5)

(Please write your Enrollment Number)

Enrollment No. 003

END TERM EXAMINATION
(May, 2019)

Subject Code: BIT 208

Subject: Operating System

Time: 3 Hours

Maximum Marks: 60

Note: Q1 is compulsory. Attempt one question each from the Units I, II, III & IV.

Q1.

(5x4=20)

- (a) Explain the concept of seek time and rotational latency in the context of disk scheduling.
- (b) Discuss the relative advantages and disadvantages of sector sparing and sector slipping.
- (c) Describe the following terms with reference to disk management:
- (i) Disk Formatting
 - (ii) Boot Block
 - (iii) Bad Block
- (d) Explain general model of a file system. How is access control verification done in files?

Q2.

UNIT-I

(5,5)

- (a) Consider the following segment table:

Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the physical addresses for the following logical addresses?

- (i) 0,430 (ii) 1,10 (iii) 2,500 (iv) 3,400 (v) 4,112
- (b) Explain the following OS structures:
- (i) Simple Structure
 - (ii) Layered Approach
 - (iii) Microkernels
 - (iv) Virtual Machine

Q3.

(5,5)

- (a) What are the advantages of spinlocks and how can we overcome the need for spinlocks?
- (b) Consider the following set of processes with the CPU burst & arrival time given in milliseconds:
Assume each context switch takes 1 unit of time.

Process	Arrival Time	Burst Time
A	0	7
B	1	5
C	2	3
D	6	2
E	12	3

Draw the Gantt chart & calculate average waiting time & average turnaround time for each of the following scheduling algorithms:

- (i) FCFS
- (ii) Shortest Job First
- (iii) Shortest Remaining Time First
- (iv) Round Robin (Time Quantum = 5ms) scheduling algorithm

P.T.O

UNIT-II

✗ Q4.

(5,5)

- (a) A computer system has a 36 bit virtual address space with a page size of 8K, and 4 byte entries per page table.
- (i) How many pages are in the virtual address space?
 - (ii) What is the maximum size of addressable physical memory in this system?
- (b) What do you understand by swap-space? Describe its use and location.

Q5.

(5,5)

- (a) Consider there are 4 frames allocated to a process and the reference string is: 1, 2, 3, 4, 5, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9, 5, 4, 5, 4, 2. Calculate the number of page faults for the following page replacement algorithms:
- (i) FIFO (ii) LRU (iii) Optimal
- (b) What is the need of stable storage and how does the RAID structure guarantee improvement in reliability and performance?

UNIT-III

Q6.

(5,5)

- (a) What do you mean by Critical Section? Explain Dining-Philosopher's problem and write its solution using semaphores and monitors.
- (b) What do you understand by free-space? What are the different ways to manage free-space on secondary storage?

✗ Q7.

(5,5)

- (a) Explain the uses of Translation Look-Aside Buffer in paging hardware along-with a diagram.
- (b) Suppose that the head of a moving head disk with 5000 tracks, numbered 0 to 4999, is currently serving a request at track 143 and has just finished a request at track 125. The queue of pending request in FIFO order is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. What is the total number of head movements needed to satisfy these requests for the following disk scheduling schemes:
1. Elevator 2. LOOK 3. C-SCAN 4. C-LOOK

UNIT-IV

✗ Q8.

(5,5)

- (a) What do you understand by Atomic Transactions? How does two-phase locking protocol ensure conflict serializability? Explain with a relevant example.
- (b) What are the different implementations of directories?

Q9.

(5,5)

- (a) Explain the directory structure and how are different directories arranged?
- (b) What are the different allocation methods for files? How is space allocated to files on secondary storage?