

2062
B.E. (Information Technology)
Fourth Semester
PCIT-403: Operating System

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part.

x-x-x

1. Define the followings: (10)
 - a) Real Time operating system
 - b) TLB
 - c) Stateful Server
 - d) Belady's Anomaly
 - e) Free Space Management

PART - A

2. a) What is critical section problem? How are semaphores help in handling this problem? Explain with the help of example. (6)
b) Define process control block with diagram. (4)
3. a) Differentiate between external and internal fragmentation with suitable example. (4)
b) Consider a logical address space of eight pages of 1024 words each, mapped onto a physical memory of 32 frames. (6)
 - I. How many bits are there in the logical addresses?
 - II. How many bits are there in the physical addresses?
 - III. If a memory reference takes 200 nanoseconds, how long does a paged memory reference take?
4. Consider the following sequence of logical addresses from a 600 byte programme:
20, 45, 107, 234, 450, 123, 309, 245, 560, 558, 364.

Assuming a page size of 50 bytes. Give the reference string and how many page faults would occur using LRU and Optimal replacement algorithms if 150 bytes of physical memory is available? (10)

PART - B

5. Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The current head position is at cylinder 143. The queue of pending requests is: 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. What is the total distance that the disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms: (10)
 - i) SSTF
 - ii) SCAN
6. Discuss in detail the deadlock detection and recovery techniques for distributed environment with example. (10)
7. Write short note on any two of the followings: (10)
 - a) Process Migration
 - b) Bully Election Algorithm
 - c) Unix file system

x-x-x

Exam.Code:0922

Sub. Code: 6841

1019

B.E. (Information Technology)

Fourth Semester

ITE-474: Operating Systems

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

- a) What is demand paging?
- b) State and explain logical and physical address space.
- c) Define system calls and system programs.
- d) Explain different file access methods.
- e) Why do we use network operating system? (5x2)

UNIT – I

- II. Describe the concept of process and PCB. Also explain different scheduling algorithms with suitable examples. (10)
- III. State and explain virtual storage management strategies. Also mention the reasons for swapping and segmentation. (10)
- IV. a) Write and explain the technique for process synchronization,
b) Explain batch systems, multi-programmed and parallel systems along with their suitable real life applications. (5,5)

UNIT – II

- V. Define directory structure. How can we provide protection to file system structure? Also explain different file allocation methods. (10)
- VI. Explain the concept of distributed file systems. How can we get remote file access? Also explain the various properties as: event ordering, mutual exclusion & atomicity with suitable examples. (10)
- VII. Write down and explain the case study on operating system services and input-output system. (10)

x-x-x

1129

B. E. (Information Technology)
Fifth Semester
ITE-543: Operating System

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part.

X-X-X

1. i) Define Timesharing and Multiprogramming operating systems?
- ii) What is Race Condition?
- iii) What is Sector sparing and sector slipping?
- iv) Define Busy waiting?
- v) What are the necessary conditions for deadlock to occur?

(10)

Part A

2. Consider the following set of processes with the CPU burst time in milliseconds:

Process	Burst Time	Priority	Arrival time
P0	9	3	0
P1	2	2	1
P2	5	4	2
P3	4	5	3
P4	2	1	4

The processes are assumed to arrive in the order: P0, P1, P2, P3, P4.

- a). Give Gantt Charts illustrate the execution of these processes using FCFS, SJF (pre-emptive), Priority (pre-emptive) and Round Robin (quantum=4), scheduling.
- b). Calculate the average turnaround time and average waiting time for each of the scheduling algorithm in part a?

(10)

3. Consider the following snapshot of a system:

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P1	2	2	3	3	6	8	7	7	10
P2	2	0	3	4	3	3			
P3	1	2	4	3	4	4			

Explaining Banker's Algorithm, answer the following

- a). What is the content of matrix NEED?
- b). Is the system in a safe state?
- c). If a request from P1 arrives for (1,1,0), can it be granted immediately?

(10)

4. a). Consider a paging system with the page table stored in memory.
 - a). If a memory reference takes 200 nanoseconds, how long does a paged memory reference take?
 - b). If we add associative registers and 75% of all page table references are found in associative registers, what is the effective memory reference time? (Assume that finding a page table entry in the associative registers takes 0 time, if the entry is there?)
- b). What is the cause of thrashing? How does the system detect thrashing? Once it detects thrashing, what can system do to eliminate this problem?

(10)

Part B

5. What do you mean by Disk Scheduling. Explain any two Disk scheduling algorithms with example. (10)
6. a). Explain - Data Migration, Computation Migration and Process Migration? (5)
- b). Compare the techniques for caching disk blocks locally on a client system and remotely on a server? (5)
7. a). Explain briefly algorithms for electing a coordinator in case of failure? (5)
- b). Discuss the layout of UNIX file system? What is the structure of i-node? How does the path name get translated to i-node number? (5)

X-X-X

1079
B.E. (Information Technology)
Fifth Semester
ITE-543/533: Operating System

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

- a) What is the role of multiprogramming and time sharing?
- b) Define the concept of thrashing.
- c) What is the dirty bit?
- d) Define the purpose of identifying swap space.
- e) What is telnet?
- f) Define stateful and stateless service.
- g) What is the critical section of a program?
- h) State the principle of locality in programs.
- i) What is meant by 'pipe' in Unix?
- j) Define a context switch.

(10x1)

UNIT - I

- II. How is process synchronization carried out using semaphores? Elaborate. (10)
- III. Describe the different deadlock management techniques. (10)
- IV. Describe paging and segmentation techniques for memory management. (10)

UNIT - II

- V. What are different file allocation methods? List their advantages and disadvantages. (10)
- VI. What are various design issues in distributed operating systems? (10)
- VII. Write short notes on:- (2x5)
 - a) Mutual Exclusion in distributed systems
 - b) Unix I/O system

x-x-x

Exam.Code:0923
Sub. Code: 6848

1128
B. E. (Information Technology)
Fifth Semester
ITE-543/533: Operating System

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

- What are the functions of an Operating system?
- Why page size is always power of 2?
- What are the main advantages of a distributed system?
- What is Belady's anomaly?
- Write four necessary conditions for Deadlocks?

(5x2)

UNIT - I

II. Consider the following set of processes with the CPU burst time in milliseconds:

Process	Burst Time	Priority	Arrival time
P0	9	3	0
P1	4	2	1
P2	2	4	2
P3	7	5	3
P4	8	1	4

The processes are assumed to arrive in the order: P0, P1, P2, P3, P4.

(10)

- Give Gantt Charts illustrate the execution of these processes using FCFS, SJF (preemptive), Priority (pre-emptive) and Round Robin (quantum=3), scheduling.
 - Calculate the average turnaround time and average waiting time for each of the scheduling algorithm in part a?
- Suggest a software solution for the problem of race condition for two processes. Show that your solution achieves mutual exclusion and Progress Requirement?
 - Solve the bounded buffer producer consumer problem using semaphore?

P.T.O.

(2)

- V. 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 FIFO, LRU and Optimal page replacement algorithms, assuming four frames? All frames are initially empty. (10)

UNIT – II

Suppose that a disk drive has 2000 cylinders, numbered 0 to 1999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order is: 86, 470, 913, 1274, 348, 1419, 1022, 750, 130. Starting from the current head position, what is the total distance that the disk arm moves to satisfy all pending requests, for each of the following disk scheduling algorithms? (Show in graph also)

- a) FCFS
 - b) SSTF
 - c) SCAN
 - d) LOOK
 - e) C-SCAN
- (10)

- VI. a) Explain different types of disk allocation methods?
b) Differentiate between Stateful and Stateless service? (5,5)
- VII. a) Explain the process of deadlock detection for distributed systems?
b) Discuss the layout of UNIX file system? What is the structure of i-node? How does the path name get translated to i-node number? (5,5)

Exam.Code:0923

Sub. Code: 6848

1078

B.E. (Information Technology)

Fifth Semester

ITE-533/543: Operating Systems

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

- a) Distinguish between time sharing and multiprogramming.
- b) State the various components of an operating system.
- c) How does Shortest Job First scheduling work?
- d) What is the function of the 'dirty' bit in memory management?
- e) Discuss C-SCAN scheduling.
- f) Define the 'happened before' relation.
- g) What are 'pipes' in UNDO?
- h) State the components of a disk address.
- i) Identify any two factors that make a distributed system 'robust'.
- j) Define the term 'starvation' in the context of processes. (10x1)

UNIT – I

- II. Elaborate any 3 crucial services provided by an operating system. (10)
- III. Describe the paging and segmentation mechanism. Can these two be combined into one scheme? If yes, identify what will be the pros and cons of such an approach. (10)
- IV. Explain how semaphores and monitors help in process synchronization. (10)

UNIT – II

- V. Discuss the different methods for allocation of space to files on disk. Compare and contrast them. (10)
- VI. Identify the various design issues for a distributed operating system. (10)
- VII. Write short notes on:-
 - a) File replication
 - b) Unix I/O system (5,5)

x-x-x

1059
B.E. (Information Technology)
Fourth Semester
ITE-474/403: Operating System

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Section.

x-x-x

I.	Define the following: a) Medium Term Scheduler b) Race Condition c) Busy Waiting d) Unix file Structure e) System Call	10																																	
Section-A																																			
II.	Consider the set of 4 processes whose arrival time and burst time are given below- <table border="1" style="margin: 10px auto; width: 80%;"> <thead> <tr> <th rowspan="2">Process No.</th><th rowspan="2">Arrival Time</th><th rowspan="2">Priority</th><th colspan="3">Burst Time</th></tr> <tr> <th>CPU Burst</th><th>I/O Burst</th><th>CPU Burst</th></tr> </thead> <tbody> <tr> <td>P1</td><td>0</td><td>2</td><td>1</td><td>5</td><td>3</td></tr> <tr> <td>P2</td><td>2</td><td>3</td><td>3</td><td>3</td><td>1</td></tr> <tr> <td>P3</td><td>3</td><td>1</td><td>2</td><td>3</td><td>1</td></tr> <tr> <td>P4</td><td>5</td><td>2</td><td>2</td><td>1</td><td>2</td></tr> </tbody> </table> <p>Assume that all I/O operations can be overlapped as much as possible. If the CPU scheduling policy is Priority Scheduling, calculate the average waiting time and average turn around time. (Lower number means higher priority)</p>	Process No.	Arrival Time	Priority	Burst Time			CPU Burst	I/O Burst	CPU Burst	P1	0	2	1	5	3	P2	2	3	3	3	1	P3	3	1	2	3	1	P4	5	2	2	1	2	10
Process No.	Arrival Time				Priority	Burst Time																													
		CPU Burst	I/O Burst	CPU Burst																															
P1	0	2	1	5	3																														
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P4	5	2	2	1	2																														
III	a) Differentiate between external and internal fragmentation with suitable example. b) Consider the following sequence of logical addresses from a 600 byte programme: 20, 45, 107, 234, 450, 123, 309, 245, 560, 558, 364. Assuming a page size of 50 bytes. Give the reference string and how many page faults would occur using LRU and Optimal replacement algorithms if 150 bytes of physical memory is available?	4,6																																	
IV	What is thrashing? When does it occur? What are the different measures to handle thrashing?	10																																	
Section-B																																			
V	Suppose that a disk drive has 2000 cylinders, numbered 0 to 1999. The current head position is at cylinder 143. The queue of pending requests is: 1186, 1750, 913, 774, 548, 150, 122, 1950, 1310 What is the total distance that the disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms: i) SSTF ii) SCAN iii) LOOK iv) C-SCAN	10																																	
VI	Discuss the Deadlock Detection in distributed Systems.	10																																	
VII	Write short note on any two of the followings: i) Process Migration ii) Unix Memory Management	10																																	

Exam.Code:0922
Sub. Code: 6841

1058

B.E. (Information Technology)
Fourth Semester
ITE-474: Operating System

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

- a) What do you mean by Process Synchronization?
- b) What are deadlocks? How it can be prevented?
- c) Define the term thrashing.
- d) How PCB works?
- e) Define mutual exclusion with a suitable example. (5x2)

UNIT - I

- II. Explain the concept of process and its states. Also explain the concurrent processes with suitable examples along with the operations that can be performed on processes. (10)
- III. Define paging and demand paging. Why do we need to replace a page? Explain different page replacement algorithm with neat representation. (10)
- IV. Explain different types of operating systems and also explain the **general** system architecture. (10)

UNIT - II

- V. a) What are file access methods? Describe different **file allocation** methods.
b) Explain different Disk scheduling and disk management techniques. (5,5)
- VI. Differentiate between Network operating systems and distributed operating systems- How remote services are useful? (10)
- VII. Write down and explain the case study on Unix O.S. Architecture. (10)

x-x-x