

(i) Printed Pages : 3

Roll No. ....

(ii) Questions : 7

Sub. Code : 

6	8	5	2
---	---	---	---

Exam. Code : 

9	2	3
---	---	---

B.Engg. Information Technology 5<sup>th</sup> Semester

1124

**OPERATING SYSTEM**

Paper : I.T-523/533

Time Allowed : Three Hours]

[Maximum Marks : 50

**Note :-** Question No. 1 is compulsory. Attempt any **two** questions each from Part-A and Part-B.

1. Define the following :

(a) System Call

(b) Spooling

(c) Race Condition

(d) TLB

(e) Thrashing

10

**PART-A**

2. (a) State whether the following are true or false with justification :

(i) Multitasking is a kind of multiprogramming.

(ii) Response time is more predictable in pre-emptive system than in non-preemptive system. 2

(b) What are Semaphores ? How are they helpful in process synchronization ? Explain the concept with Reader-Writer problem. 8

6852/BDF-24656

1

[Turn over

**PART - B**

Qn 5 a) Explain the window to viewport mapping and de

3. (a) In a 32-bit machine, 3-level paging is used such that the first 10-bits are used for 1<sup>st</sup> level, the next 6-6 bits are used for 2<sup>nd</sup> level and 3<sup>rd</sup> level, and 10 bits are used to represent the offset :

- (i) What is the page size ?
- (ii) What is the maximum number of pages that can exist for a process ?
- (iii) If 6-bits are used to represent frame number, then what is the size of physical memory ?

- (b) Differentiate between external and internal fragmentation with suitable example.

4. (a) Consider the following snapshot of a system and answer the following using Banker's Algorithm :

- (i) What are the contents of matrix **Need** ? Is the system in safe state ?
- (ii) if a request from process P1 arrives for (0, 4, 2, 0), can the request be granted immediately ?

	Allocation				MAX				Avaliable			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				



hat the fi  
s are us  
represen

(b) Consider the following page reference string :

4, 0, 0, 0, 2, 4, 2, 1, 0, 3, 2

Assume the page replacement algorithms are Optimal and LRU.

- (i) Find out the page faults in each using four page frames.
- (ii) How many page faults will occur if the working set policy with LRU is used with a window size of 4 ? 4

### PART-B

6  
5. Write short notes on any **two** of the following :

- (a) File allocation methods
- (b) Distributed File naming
- (c) Unix file system. 10

6. How deadlocks are detected and recovered in distributed environment ? 10

7. Suppose that a disk drive has 2000 cylinders, numbered 0 to 1999. The current head position is at cylinder 150. The queue of pending requests is : 186, 147, 13, 177, 948, 1509, 102, 1750 and 1306. 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) C-SCAN

10

Exam Code: 0923

Sub. Code: 6853

1076

B.E. (Information Technology) Fifth Semester  
IT-523/533: 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) What are the features of a SMP system?
- b) What is the function of a 'monitor'?
- c) Define the term 'thrashing'.
- d) What are the factors to consider in adopting a deadlock handling approach?
- e) State Belady's anomaly.
- f) Describe C-SCAN scheduling.
- g) What is anonymous ftp?
- h) Define location independence.
- i) What is stateless service?
- j) Which file system is used in Unix? State any 2 main features of it. (10x1)

### UNIT - I

- II. a) Define the essential properties of the following types of operating systems: time sharing systems, and real time systems. Also give an example of each such operating system.  
b) What is a virtual machine? Discuss some advantages and disadvantages of implementing virtual machines. (5,5)
- III. a) Elaborate the different process scheduling algorithms. Which ones favour shorter processes?  
b) Define the following terms:-  
Busy waiting and spinlocks in the context of process synchronization. (5,5)
- IV. Discuss the concept of paging and segmentation with the help of examples. Explain how page faults occur and the actions taken by the operating system to handle them. (10)

P.T.O



(2)

**UNIT - II**

- V. a) Discuss the common schemes for implementing logical structure of a directory. (5,5)  
b) Explain the different ways of swap space management in disks.
- VI. a) How can mutual exclusion be implemented in a distributed environment? (5,5)  
b) Explain how 2PC ensures transaction atomicity despite failure.
- VII. Write short notes on:-  
a) Unix I/O system (5,5)  
b) Unix C shell

x-x-x

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) What are the services provided by the Operating System?
- ii) What is Critical section?
- iii) Differentiate between Logical and Physical address?
- iv) Define Spinlock?
- v) What is Sector sparing and sector slipping?
- vi) Define Dispatch latency?
- vii) Why are page sizes always power of 2?
- viii) What are the necessary conditions for deadlock to occur?
- ix) Differentiate between relative and absolute address?
- x) What is belady's anomaly?

(10)

**Part A**

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

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

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= 2), scheduling.
  - b). Calculate the average turnaround time and average waiting time for each of the scheduling algorithm in part a? (10)
3. a). What are semaphores? How semaphores provide process synchronization? Explain with the help of Reader writers problem? (6)
  - b). What are deadlocks? Can a system detect that some of its processes are starving? If yes, explain how it can? If no, explain how the system can deal with starvation problem? (4)
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? (5)

P.T.O.

**Part B**

5. Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. 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, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. starting from the current head position, what is the total distance that 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
6. a). Explain - Data Migration, Computation Migration and Process Migration? (10)  
b). Compare the techniques for caching disk blocks locally on a client system and remotely on a server? (5)
7. a). Write short note on memory management in UNIX? (5)
- (10)

X-X-X



(i) Printed Pages : 3

Roll No. ....

(ii) Questions : 7

Sub. Code : 

6	8	5	2
---	---	---	---

Exam. Code : 

9	2	3
---	---	---

B.Engg. Information Technology 5<sup>th</sup> Semester

1124

**OPERATING SYSTEM**

Paper : I.T-523/533

Time Allowed : Three Hours]

[Maximum Marks : 50

**Note :-** Question No. 1 is compulsory. Attempt any **two** questions each from Part-A and Part-B.

1. Define the following :

(a) System Call

(b) Spooling

(c) Race Condition

(d) TLB

(e) Thrashing

10

**PART-A**

2. (a) State whether the following are true or false with justification :

(i) Multitasking is a kind of multiprogramming.

(ii) Response time is more predictable in pre-emptive system than in non-preemptive system. 2

(b) What are Semaphores ? How are they helpful in process synchronization ? Explain the concept with Reader-Writer problem. 8

6852/BDF-24656

1

[Turn over

PART - B

Qn 5 a) Explain the window to viewport mapping and de



3. (a) In a 32-bit machine, 3-level paging is used such that the first 10-bits are used for 1<sup>st</sup> level, the next 6-6 bits are used for 2<sup>nd</sup> level and 3<sup>rd</sup> level, and 10 bits are used to represent the offset :

- (i) What is the page size ?
- (ii) What is the maximum number of pages that can exist for a process ?
- (iii) If 6-bits are used to represent frame number, then what is the size of physical memory ?

- (b) Differentiate between external and internal fragmentation with suitable example.

4. (a) Consider the following snapshot of a system and answer the following using Banker's Algorithm :

- (i) What are the contents of matrix **Need** ? Is the system in safe state ?
- (ii) if a request from process P1 arrives for (0, 4, 2, 0), can the request be granted immediately ?

	Allocation				MAX				Avaliable			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

hat the fi  
s are us  
represen

(b) Consider the following page reference string :

4, 0, 0, 0, 2, 4, 2, 1, 0, 3, 2

Assume the page replacement algorithms are Optimal and LRU.

- (i) Find out the page faults in each using four page frames.
- (ii) How many page faults will occur if the working set policy with LRU is used with a window size of 4 ? 4

### PART-B

6  
5. Write short notes on any **two** of the following :

- (a) File allocation methods
- (b) Distributed File naming
- (c) Unix file system. 10

6. How deadlocks are detected and recovered in distributed environment ? 10

7. Suppose that a disk drive has 2000 cylinders, numbered 0 to 1999. The current head position is at cylinder 150. The queue of pending requests is : 186, 147, 13, 177, 948, 1509, 102, 1750 and 1306. 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) C-SCAN

10



Exam Code: 0923

Sub. Code: 6853

1076

B.E. (Information Technology) Fifth Semester  
IT-523/533: 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) What are the features of a SMP system?
- b) What is the function of a 'monitor'?
- c) Define the term 'thrashing'.
- d) What are the factors to consider in adopting a deadlock handling approach?
- e) State Belady's anomaly.
- f) Describe C-SCAN scheduling.
- g) What is anonymous ftp?
- h) Define location independence.
- i) What is stateless service?
- j) Which file system is used in Unix? State any 2 main features of it. (10x1)

### UNIT - I

- II. a) Define the essential properties of the following types of operating systems: time sharing systems, and real time systems. Also give an example of each such operating system.  
b) What is a virtual machine? Discuss some advantages and disadvantages of implementing virtual machines. (5,5)
- III. a) Elaborate the different process scheduling algorithms. Which ones favour shorter processes?  
b) Define the following terms:-  
Busy waiting and spinlocks in the context of process synchronization. (5,5)
- IV. Discuss the concept of paging and segmentation with the help of examples. Explain how page faults occur and the actions taken by the operating system to handle them. (10)

P.T.O

(2)

**UNIT - II**

- V. a) Discuss the common schemes for implementing logical structure of a directory. (5,5)  
b) Explain the different ways of swap space management in disks.
- VI. a) How can mutual exclusion be implemented in a distributed environment? (5,5)  
b) Explain how 2PC ensures transaction atomicity despite failure.
- VII. Write short notes on:-  
a) Unix I/O system (5,5)  
b) Unix C shell

x-x-x



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) What are the services provided by the Operating System?
- ii) What is Critical section?
- iii) Differentiate between Logical and Physical address?
- iv) Define Spinlock?
- v) What is Sector sparing and sector slipping?
- vi) Define Dispatch latency?
- vii) Why are page sizes always power of 2?
- viii) What are the necessary conditions for deadlock to occur?
- ix) Differentiate between relative and absolute address?
- x) What is belady's anomaly?

(10)

**Part A**

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

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

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= 2), scheduling.
  - b). Calculate the average turnaround time and average waiting time for each of the scheduling algorithm in part a? (10)
3. a). What are semaphores? How semaphores provide process synchronization? Explain with the help of Reader writers problem? (6)
  - b). What are deadlocks? Can a system detect that some of its processes are starving? If yes, explain how it can? If no, explain how the system can deal with starvation problem? (4)
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? (5)

P.T.O.

**Part B**

5. Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. 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, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. starting from the current head position, what is the total distance that 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
6. a). Explain - Data Migration, Computation Migration and Process Migration? (10)  
b). Compare the techniques for caching disk blocks locally on a client system and remotely on a server? (5)
7. a). Write short note on memory management in UNIX? (5)
- (10)

X-X-X