CBCS SCHEME

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15CS64

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Operating Systems

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. What is operating system? Explain multiprogramming and time sharing systems. **(06 Marks)**

b. Explain dual mode operating in operating system with a neat block diagram. **(05 Marks)**

c. What are system calls? Briefly point out its types. **(05 Marks)**

OR

2 a. Explain process states with state transition diagram. Also explain PCB with a neat diagram. **(06 Marks)**

b. What is interprocess communication? Explain its types. **(05 Marks)**

c. With a neat diagram, explain the concept of virtual machines. **(05 Marks)**

Module-2

3 a. For the process listed below, draw Gantt charts using pre-emptive and non-preemptive priority scheduling algorithm. A larger priority number has a higher priority. Calculate Average Weighing Time and Average turnaround time.

Jobs	Arrival Time	Burst Time	Priority
J_1	0	6	4
J_2	3	5	2
J_3	3	3	6
J_4	5	5	3

(06 Marks)

b. Is CPU scheduling necessary? Discuss the five different scheduling criterias used in the computing scheduling mechanism. **(05 Marks)**

c. Explain multithreading models. **(05 Marks)**

OR

4 a. Define semaphores. Explain its usage and implementation. **(06 Marks)**

b. Explain Reader-Write problem with semaphore in detail. **(05 Marks)**

c. What are monitors? Explain dining Philospher's solution using monitor. **(05 Marks)**

Module-3

5 a. System consists of five jobs (J_1, J_2, J_3, J_4, J_5) and three resources (R_1, R_2, R_3). Resource type R_1 has 10 instances, resource type R_2 has 5 instances and R_3 has 7 instances. The following snapshot of the system has been taken.

Jobs	Allocation			Maximum			Available		
	R_1	R_2	R_3	R_1	R_2	R_3	R_1	R_2	R_3
J_1	0	1	0	7	5	3	3	3	2
J_2	2	0	0	3	2	2			
J_3	3	0	2	9	0	2			
J_4	2	1	1	2	2	2			
J_5	0	0	2	4	3	3			

Find need matrix and calculate the safe sequence by using Banker's algorithm. Mention the above system is safe or not safe. **(06 Marks)**

b. What is dead lock? What are necessary conditions an operating system must
dead lock to occur?
c. What is a Resource Allocation Graph (RAG)? Explain how RAG is very useful is
deadly embrace by considering own example.

OR

6 a. What are Translation Load aside Buffer (TLB)? Explain TLB in detail with a simple
system with a neat diagram. (06 M
b. Given the memory partitions of 100 K, 500 K, 200 K, 300 K and 600 K apply first fit,
fit and worst fit algorithms to place 212K, 417K, 112K and 426K. (05 M
c. Describe both internal and external fragmentation problems encountered in a contig
memory allocation scheme. (05 M

Module-4

7 a. Consider the following page reference stream: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, (
0, 1. How many page faults would occur for LRU and FIFO replacement algo
assuming 3 frames? Which one of the above is most efficient? (06
b. Explain demand paging system. (05
c. What is thrashing? How can it be controlled? (05

OR

8 a. Explain briefly the various operations performed on files. (06
b. Explain the various access methods of files. (05
c. Explain various allocation methods in implementing file systems. (05

Module-5

9 a. Explain the various Disk Scheduling algorithms with example. (08
b. Explain access matrix method of system protection. (08

OR

10 a. With a neat diagram explain in detail components of a Linux system. (06
b. Explain the different IPC mechanisms available in Linux. (05
c. Explain process scheduling in a Linux system. (05

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CBCS SCHEME

15CS64

Sixth Semester B.E. Degree Examination, June/July 2019
Operating Systems

ime: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the role of operating system from different viewpoints. Explain the dual mode of operation of an operating system. (07 Marks)
b. Demonstrate the concept of virtual machine with an example. (05 Marks)
c. Explain the types of multiprocessing system and the types of clustering. (04 Marks)

OR

2 a. Describe the implementation of interprocess communication using shared memory and message passing. (06 Marks)
b. Demonstrate the operations of process creation and process termination in UNIX. (06 Marks)
c. Explain the different states of a process, with a neat diagram. (04 Marks)

Module-2

3 a. Discuss the threading issues that come with multithreaded program. (08 Marks)
b. Illustrate how Reader's-Writer's problem can be solved by using semaphores. (08 Marks)

OR

4 a. Calculate the average waiting time by drawing Gantt chart using FCFS (First Come First Serve), SRTF (Shortest Remaining Time First), RR (Round Robin) [q = 2 ms] algorithms.

Process	Arrival time	Burst time
P_1	0	9
P_2	1	4
P_3	2	9
P_4	3	5

(08 Marks)

b. Explain the Dining-Philosopher's problem using monitors. (08 Marks)

Module-3

5 a. Determine whether the following system is in safe state by using Banker's algorithm.

Process	Allocation			Maximum			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	1	0	7	5	3	3	3	2
P_1	2	0	0	3	2	2			
P_2	3	0	2	9	0	2			
P_3	2	1	1	2	2	2			
P_4	0	0	0	4	3	3			

If a request for P_1 arrives for (1 0 2), can the request be granted immediately? (09 Marks)
b. Discuss the various approaches used for deadlock recovery. (07 Marks)

OR

6 a. Illustrate with example, the internal and external fragmentation problem enc[illegible] continuous memory allocation.

b. Explain the structure of page table.

Module-4

7 a. Illustrate how demand paging affects systems performance. (08

b. Describe the steps in handling a page fault. (08

OR

8 a. Explain the various types of directory structures. (08

b. Describe various file allocation methods. (08

Module-5

9 a. Explain the access matrix model of implementing protection in operating system. (07

b. Explain the following disk scheduling algorithm in brief with examples:

i) FCFS scheduling
ii) SSTF scheduling
iii) SCAN scheduling
iv) LOOK scheduling (09 M

OR

10 a. Explain the components of LINUX system with a neat diagram. (08 M

b. Explain the way process is managed in LINUX platform. (08 M

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15CS64

Sixth Semester B.E. Degree Examination, June/July 2018
Operating Systems

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Define Operating System. With a neat diagram, explain the dual-mode operation of operating system. **(06 Marks)**

b. Explain the services of operating system that are helpful for user and the system. **(06 Marks)**

c. Define the following terms :
i) Virtual Machine
ii) CPU scheduler
iii) System call
iv) Context switch. **(04 Marks)**

OR

2 a. With a neat diagram, explain the different states of a process. **(05 Marks)**

b. Explain the layered approach of operating system structure, with supporting diagram. **(05 Marks)**

c. What is interprocess communication? Explain direct and indirect communication with respect to message passing system. **(06 Marks)**

Module-2

3 a. Explain multithreading models, Also list the benefits of multithreaded programming. **(06 Marks)**

b. Consider the following set of processes given in table

Processes	Arrival Time (m sec)	Burst Time (m sec)	Priority
P_1	0	10	4
P_2	3	5	2
P_3	3	6	6
P_4	5	4	3

Consider larger number as highest priority. Calculate average waiting time and turn around time and draw Gantt chart for preemptive priority scheduling and preemptive SJF scheduling. **(06 Marks)**

c. Explain multiprocessor scheduling. **(04 Marks)**

OR

4 a. What are the requirements to critical section problem? Explain Peterson's solution to critical section problem. **(06 Marks)**

b. Explain Dining-philosophers problem with semaphores. **(05 Marks)**

c. Explain the syntax and schematic view of monitors. **(05 Marks)**

Module-3

5 a. Consider the following snapshot of a system

	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	0	2	0	0	4	1	0	2
P_1	1	0	0	2	0	1			
P_2	1	3	5	1	3	7			
P_3	6	3	2	8	4	2			
P_4	1	4	3	1	5	7			

Find the need matrix and calculate safe sequence using Banker's algorithm. M above system is safe or not safe.

b. What are the necessary conditions for deadlock? Explain different methods to re deadlock.

OR

6 a. What is paging? Explain paging hardware with translation look-aside buffer.

b. Explain the structure of page table with respect to hierarchical paging.

c. Given the 5 memory partitions 100 KB, 500 KB, 200 KB, 300 KB and 600 KB, h the first fit, best fit and worst fit algorithms place processes of 212 KB, 417 KB, 1 426KB size. Which algorithm makes efficient use of memory?

Module-4

a. What is a page fault? With a supporting diagram explain the steps involved in han fault.

b. Consider the page reference string for a memory with three frames, how many p will occur for FIFO, LRU and optimal page replacement algorithms. Which efficient?

Reference string : 7 0 1 2 0 3 0 4 2 3 0 3 2 0 1 7

c. Explain copy-on-write process in virtual memory.

OR

8 a. What are the different allocation methods in disk? Explain in detail any two method

b. List the different directory structure. Explain acyclic – graph directory and tree directory.

c. What is a file? Also list different file operations.

Module-5

9 a. List the different disk scheduling techniques, explain any two scheduling, consid following disk queue requests 98, 183, 37, 122, 14, 124, 65, 67.

b. What is an access matrix? Explain the different methods of implementing access ma

c. Explain bad – block recovery in disk.

OR

10 a. Explain the design principle of Linux.

b. Explain the process management in Linux platform.

c. Explain the interprocess communication mechanisms in Linux.

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10CS53

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Operating System

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Write and explain the sequence of system call cervices those are helpful for copying a file to another (new) file. **(06 Marks)**

b. Discuss the Operating System functions that are (i) helpful to user (ii) meant for ensuring the efficient operation of system. **(10 Marks)**

c. List the advantages of multiprocessor system. Explain "graceful degradation" and "fault tolerant" in a multiprocessor system. **(04 Marks)**

2 a. Explain Process State with diagram. What is the need for context switch? Explain fields of PCB. **(06 Marks)**

b. Consider four jobs as following. Find waiting time, turnaround time and hence average waiting time and average turnaround time using preemptive SJF and RR (with quantum time = 1) scheduling algorithms. If quantum time is set to 2, what is the behavior of RR? Comment on this.

Jobs	P_1	P_2	P_3	P_4
Arrival time	0	0.2	0.6	1.2
Burst time	5	2	8	4

(10 Marks)

c. Why thread is called LWP? Describe anyone threading model and threading issue. **(04 Marks)**

3 a. What are the three requirements to be met by a solution to the critical section problem? Explain. **(06 Marks)**

b. Describe the bounded-buffer problem and give a solution for the same using semaphores Write the structure of procedure and consumer processes. **(07 Marks)**

c. Describe Dining-Philosopher problem in detail. **(07 Marks)**

4 a. In a Resource-allocation graph (algorithm), "If each resource type has several instances, then a cycle does not necessarily imply that a deadlock has occurred." Justify this statement with suitable example. **(04 Marks)**

b. Consider the following snapshot of a system

Processes	Allocation				Maximum				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P_0	0	0	1	2	0	0	1	2	1	5	2	0
P_1	1	0	0	0	1	7	5	0				
P_2	1	3	5	4	2	3	5	6				
P_3	0	6	3	2	0	6	5	2				
P_4	0	0	1	4	0	6	5	6				

Answer the following questions using Banker's Algorithm stepwise.

(i) What is the content of matrix need?

(ii) Is the system in a safe state?

(iii)If request from process P_1 arrives for (0, 4, 2, 0) can the request be granted immediately? **(12 Marks)**

c. Describe the features that characterize deadlocks.

PART – B

5 a. Explain the concept of forward-mapped page table. (05 M
b. Explain the steps in handling page faults with neat diagram. (05 M
c. Consider following page reference strings.
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 occu case of LRU, FIFO and OPT page replacement algorithms assuming memory with 5 fra Which is the most efficient algorithm? (10 Ma

6 a. Explain File Attributes and File operations. (12 Ma
b. Explain different file access methods. (08 Ma

7 a. A disk drive has 200 cylinders numbered 0 to 199. Drive is currently servicing request at Queue of pending requests in FIFO order are 98, 183, 37, 122, 14, 124, 65, 67. Starting f current head position, what is the total distance that the disk arm moves in cylinder satisfy all pending requests for FCFS, SSTF, LOOK, SCAN disk scheduling algorithms figures in each case. (12 M
b. What is Access Matrix? Explain with domains as objects. (08 M

8 Write short notes on :
a. Components of LINUX system
b. IPC facility in LINUX
c. SCAN and C-SCAN disk scheduling algorithms.
d. Tree directory structure. (20 M

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10CS

Fifth Semester B.E. Degree Examination, Dec.2018/Jan. 2019
Operating System

Time: 3 hrs. Max. Marks:10

Note: *Answer FIVE full questions, selecting atleast TWO questions from each part*

PART – A

1 a. Define operating system. Explain different views of operating system. (08 Mar
b. What are virtual machines? Explain VM-WARE architectures with neat diagram. (08 Mar
c. Explain process management activities. (04 Mar

2 a. With neat diagram explain different states of a process. (05 Mar
b. Discuss scheduling criteria used in operating system. (05 Ma
c. For the following example calculate average waiting time and average turnaround time us FCFS, pre-emptive SJF, and RR[1 time unit] CPU scheduling algorithms.

Jobs	Arrival–Time	Burst–time
P1	0	8
P2	1	4
P3	2	9
P4	3	5

(10 Mar

3 a. What is critical section problem? Explain semaphore solution to critical section problem. (07 Ma
b. Describe the monitor solution to the classical dining philosopher problem. (08 Mar
c. Define race condition. Explain readers writer problem with semaphore in detail. (05 Mar

4 a. What is deadlock? What are necessary conditions on operating system must satisfy fo deadlock to occur? (06 Mar
b. For the following snapshot find the safe sequence using Banker's algorithm.

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	0	2	0	0	4	1	0	2
P_1	1	0	0	2	0	1			
P_2	1	3	5	1	3	7			
P_3	6	3	2	8	4	2			
P_4	1	4	3	1	5	7			

i) Is the system in safe state? (09 M
ii) If a request from process P_2 arrives for (0, 0, 2) can the request be granted? (05 M
c. How is system recovered from deadlock?

PART – B

5 a. What are translation look aside buffer (TLB)? Explain in detail with a simple p... with a neat diagram.
b. Given the memory partitions of 100k, 500k, 200k, 300k and 600k. Apply first fi... algorithm to place 212k, 417k, 112k, 426k processes respectively.
c. Consider the following page replacement string 10710212303240362107 for a mem... 3 frames. How many page faults occur for LRU and FIFO page replacement al... Which is the efficient among both?

6 a. Explain how free space is managed.
b. Explain the different file access methods.
c. What is a file? Explain different allocation methods.

7 a. Describe the access matrix model used for protection purpose.
b. Suppose the position of cylinder is at 53. The disk drive has cylinders numbered ... 199. The queue of parading request in FIFO order is : 98, 183, 37, 122, 14 12... Starting from the current head position what is the total distance travelled (in cyl... the disk arm to satisfy the requests using algorithm : i) FCFS ii) SSTF iii) S... iv) Look. Illustrate with figures in each case.

8 a. Explain the different system components of Linux OS.
b. Discuss the interprocess communication facility in UNIX operating system.

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Fifth Semester B.E. Degree Examination, June/July 2019

Operating Systems

Time: 3 hrs. Max. Marks:1

Note: *Answer any FIVE full questions, selecting at least TWO questions from each part.*

PART – A

1 a. Discuss the types of multiprocessor systems and the advantages of multiprocessor systen (06 M

b. Which calls provide an interface to the service made available by an operating syst Explain the same with suitable examples. (06 M

c. Explain the method of operating system design which involves using object orie programming technique with a neat diagram. (08 Ma

2 a. List the operating system primitives that are used in direct and indirect communica between cooperating process. (04 Ma

b. Name and explain the formula that is used to predict the value of the next CPU b required for shortest job first scheduling method. (06 Ma

c. Four processes P1, P2, P3 and P4 arrive in the order given below with the following C burst and priority values. Compute the average waiting time using:

i) Round Robin with time quantum = 3

ii) Preemptive priority scheduling (low values has high priority)

iii) Preemptive shortest job first scheduling.

Process	CPU burst	Arrival time	Priority
P1	8	0	5
P2	4	2	2
P3	6	3	3
P4	1	5	1

(10 Mar

3 a. Consider two concurrently running processes P1 with statement S1 and S3 along with with statements S2 and S4. The required order of execution of the statements must be S S4, S1 and S3. Solve this problem using semaphores. (08 Marl

b. Define and explain the semaphore structure, wait operation and signal operation of semaphore which avoids busy waiting. (06 Marl

c. Discuss the importance of processor affinity and the types of processor affinity. (06 Marl

4 a. Explain the steps involved in a resource allocation graph algorithm which is used to avo deadlocks. (06 Marl

b. Explain how the circular wait condition can be used to prevent deadlocks. (04 Mark

c. Assume there are 3 processes P0 through P2 and 3 resource types each having 4 instance The allocation and max matrix is given below:

	Allocation			Max		
	A	B	C	A	B	C
P0	2	1	2	4	1	3
P1	1	1	1	2	1	2
P2	0	1	1	1	1	1

Answer the following questions using Banker's algorithm:

i) Is the system in safe state? If so find safe sequence.

ii) At time t1, if a request from process P1 arrives for (0, 1, 0) can the request be grante If so find the safe sequence.

iii) At time t2, if a request from process P1 arrives for (1, 0, 0) can the request be grante If so find the safe sequence. (10 Mar

PART – B

5 a. Illustrate and explain Belady's anomaly using a suitable example. (06 Mar

b. Explain the strategy used to prevent thrashing. (06 Mar

c. Explain segmentation and how the physical address is generated using a neat diagram. (08 Ma

6 a. List and explain the most common schemes used for defining the logical structure directory. (10 Ma

b. Discuss the four techniques used to keep track of free disk space. (10 Ma

7 a. List and explain any four methods used for implementing access matrix. (10 Ma

b. Suppose that a disk drive has 200 cylinders numbered 0 to 199. The drive is curre serving a request at cylinder 53 and the previous request was at 43. The queue of pen requests in FIFO order is 98, 183, 37, 122, 14, 124, 65, 67. Starting from current pos calculate total cylinders crossed using SCAN, CSCAN and FCFS disk schedu algorithms. (10 Ma

8 Write short notes on:

a. Driver registration in LINUX (07 Ma

b. Kernel synchronization in LINUX (07 Ma

c. Implementation of virtual machines (06 Ma

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10CS53

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Operating System

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. What is an operating system? Explain abstract view of component of a computer system. **(07 Marks)**

b. List the different services that an operating system provides. Explain. **(06 Marks)**

c. Explain the concept of virtual machines. Bring out its advantages. **(07 Marks)**

2 a. What is a process? With a state diagram, explain states of a process. **(06 Marks)**

b. Describe the implementation of IPC using shared memory and message passing. **(07 Marks)**

c. Consider the following set of process.

Process	Arrival time	Burst time
P_1	0	6
P_2	2	3
P_3	4	3
P_4	5	5

i) Draw the Gantt chart showing the execution of the following process FCFS, SRTF and RR (quantum = 1 m sec)

ii) Compute the turnaround time, waiting time and average waiting time for each process. **(07 Marks)**

3 a. What is Busy waiting in a critical section concept? How semaphore is used to solve critical section problem? What are the advantages of semaphores? **(10 Marks)**

b. What is a monitor? Explain the solution to the classical dining philospher's problem, using monitor. **(10 Marks)**

4 a. Explain Resource-Request algorithm. **(06 Marks)**

b. What is a Deadlock? Briefly explain the methods for handling deadlocks. **(06 Marks)**

c. Consider a system with five processes P_0 through P_4 and three resources A, B, C Resources A has ten instances, resources type B has five instance and resource type C has seven instances. Suppose that at time To the following snapshot of the system has been taken.

Processes	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	1	0	7	5	3	3	3	2
P_1	2	0	0	3	2	2			
P_2	3	0	2	9	0	2			
P_3	2	1	1	2	2	2			
P_4	0	0	2	4	3	3			

(i) Is the system in a safe state?

(ii) If a request from P_1 arrives for (1, 0, 2) can the request be granted immediately. **(08 Marks)**

PART – B

5 a. Give the difference between (i) Internal and external fragmentation (ii) Paging segmentation. (06 M

b. Discuss the steps involved in handling page faults with diagram. (06 M

c. Consider the following page reference string,
7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1
for a memory with three frames. How many page faults would occur for LRU, FIFO optimal page replacement algorithm? Which is the most efficient among them? (08 M

6 a. Explain the following (i) file types (ii) file operations (iii) file attributes (12 M

b. Explain the methods used for implementing directories. (08 M

7 a. Suppose a disk drive has 5000 cylinders numbered 0 to 4999. Drive is currently se request a cylinder 143 and previous request was at cylinder 125, queue of pending re in FIFO order is 86, 1470, 913, 1774, 948, 1509, 1022, 1756, 130 starting from current position, what is the total distances (in cylinder) that the disk arm moves to satis pending request for FCFS, SSTF, LOOK and SCAN disk scheduling algorithm. (10 M

b. Explain access matrix with examples. (05 M

c. Explain the various questioning that arise in revocation of access rights. (05 M

8 a. Distinguish between fork ( ) and clone ( ) system call. Also customize the clone ( ) s call to fork ( ) functionality with suitable modifications / settings. (08 M

b. Explain the Linux device drive with the block structure. (12 M

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10CS53

Fifth Semester B.E. Degree Examination, June/July 2018
Operating Systems

Time: 3 hrs. Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO questions from each part.*

PART – A

1 a. Define operating system. Explain the role of operating system with user and system viewpoints. (07 Marks)

b. What are operating system activities connected with :
i) Process management ii) Memory management. (06 Marks)

c. With a neat diagram, explain the concept of virtualization and its advantages. (07 Marks)

2 a. Describe the process states with the help of a neat diagram. (06 Marks)

b. Define thread. Explain different threading models with neat diagram. (06 Marks)

c. Given below is the snapshot of processes. Draw Gantt charts using preemptive and non preemptive priority scheduling algorithm. (A smaller number has a higher priority). Also, calculate the average waiting time for both.

Process	Arrival time	Burst time	Priority
P_1	0	6	4
P_2	3	5	2
P_3	3	3	6
P_4	5	5	3

(08 Marks)

3 a. What is race condition? Explain three requirements to be satisfied for critical section problem. (04 Marks)

b. Give a solution to the bounded buffer problem using semaphores. Write the structure of producer and consumer processes. (08 Marks)

c. Give a solution to the dining Philosopher's problem using monitor. (08 Marks)

4 a. What is deadlock? What are the necessary conditions for a deadlock situation? (05 Marks)

b. How can deadlock be prevented? Describe any three of them. (06 Marks)

c. Consider the following snapshot of a system.

	Allocation			Maximum			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	1	0	7	5	3	3	3	2
P_1	2	0	0	3	2	2			
P_2	3	0	2	9	0	2			
P_3	2	1	1	2	2	2			
P_4	0	0	2	4	3	3			

Answer the following questions using Banker's algorithm.
i) What is the content of the matrix–Need?
ii) Is the system in a safe state?
iii) If a request from P1 arrives for (1, 0, 2), can the request be granted immediately? (09 Marks)

PART – B

5 a. Given five memory partitions of 100kb, 500kb, 200kb, 300kb and 600kb (in order), how would each of the first–fit, best–fit and worst–fit algorithms place processes of 212kb, 417kb and 426kb (in order)? Which algorithm makes the most efficient use of memory? (04 Marks)

b. With a neat diagram, explain the concept of paging with TLB. (08 Marks)

c. Consider the following page reference stream : 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0. Calculate the number of page faults when the number of frames is three, using FIFO and LRU page replacement algorithms. (08 Marks)

6 a. List and explain the file attributes and file operations. (06 Marks)

b. Explain directory structures (any two) and list their advantages and disadvantages. (06 Marks)

c. Explain with neat diagram, linked and indexed method of allocating disk space. (08 Marks)

7 a. Consider a disk queue with request for I/O to blocks on following cylinders in order 98, 183, 37, 122, 14, 124, 65, 67.
If the disk head is initially at 53, calculate the total head movements when the following scheduling are used : i) FCFS ii) SSTF. (08 Marks)

b. Explain goals of protection. (04 Marks)

c. What is access matrix? Explain its implementation (any two). (08 Marks)

8 Write short notes on :

a. Components of a Linux system

b. Design principles of Linux system

c. Internal and external fragmentation

d Thrashing with respect to memory management. (20 Marks)

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10CS53

Fifth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Operating Systems

Time: 3 hrs. Max. Marks:100

Note: *Answer FIVE full questions, selecting at least TWO questions from each part.*

PART – A

1 a. Distinguish between the following pairs of terms :
   i) Symmetric and asymmetric multiprocessor systems
   ii) Cpu burst and I/O burst jobs
   iii) User's view and systems view of OS
   iv) Batch systems and time sharing systems
   v) User mode and kernel mode operations. (10 Marks)

b. List the three main advantages of multiprocessor systems. Also bring out the difference between graceful degradation and fault tolerance in this context. (05 Marks)

c. What are virtual machines? How are they implemented? (05 Marks)

2 a. What is a process? What are the states a process can be in? Give the process state diagram clearly indicating the conditions for a process to shift from one state to another. (08 Marks)

b. What are the merits of inter process communication? Name the two major models of inter process communication. (06 Marks)

c. What is a thread? What is need for multithreaded processes? Indicate the four major categories of benefits derived from multi threaded programming. (06 Marks)

3 a. What is a critical section problem? What requirements should a solution to critical section problem satisfy? State Peterson's solution and indicate how it satisfies the above requirements. (10 Marks)

b. Explain the operation of semaphores. Bring out how their operation may lead to priority inversion. (10 Marks)

4 a. Define deadlock. What are the necessary conditions for deadlock to occur? Indicate how many of these should occur for dead lock to happen? (10 Marks)

b. State and explain banker's algorithm for deadlock avoidance. (10 Marks)

PART – B

5 a. What is the principle behind paging? Explain its operation, clearly indicating how the logical addresses are converted to physical addresses. (10 Marks)

b. A hypothetical main memory can store only 3 frames simultaneously. The sequence in which the pages will be required is given below:
7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 (Twenty operations).
Indicate the sequence in which the three frames will be filled in i) FIFO ii) Optimal Page Replacement and iii) Least Recently used methods of page replacement. Indicate number of page faults in each case. (10 Marks)

6 a. List any five typical file attributes and any five file operations indicating their purpose in one line each. (10 Marks)

b. Briefly explain the methods of keeping track of free space on disks, (10 Marks)

7 a. What is disk scheduling? Discuss different disk scheduling techniques. (12 Marks)

b. Explain the capability lists methods of implementing access matrix. (08 Marks)

8 a. How does Linux achieve interprocess communication? (10 Marks)

b. How does Linux manage authentication and access control mechanisms? (10 Marks)

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PART – B

5 a. Discuss paging with an example.

b. Consider the following page reference string
1, 2, 3, 5, 2, 3, 5, 7, 2, 1, 2, 3, 8, 6, 4, 3, 2, 2, 3, 6.
Assuming there are 3 memory frames, how many page faults would occur in
i) LRU ii) Optimal Algorithm.
Note that initially all frames are empty.

c. What is thrashing? Explain.

6 a. Explain the different file access methods.

b. Describe the various directory structures.

c. Write a note on any four different methods for managing free space.

7 a. Suppose the position of cylinder is at 53. The disk drive has cylinders numb
199. The queue of pending request in FIFO order is: 98, 183, 37, 122, 14
Starting from the current head position, what is the total distance traveled (in
the disk arm to satisfy the requests using algorithms FCFS, SSTF, SCAN
Illustrate with figures in each case.

b. Describe the access matrix model used for protection purpose.

8 Write short notes on :

a. Process Management in Linux

b. Linux file system.

c. Benefits of Multi threading

d. Inter process communication.

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10CS53

Fifth Semester B.E. Degree Examination, June/July 2017
Operating Systems

Time: 3 hrs. Max. Marks:100

Note: *Answer FIVE full questions, selecting at least TWO questions from each part.*

PART – A

1 a. What is operating system? Explain multiprogramming and time sharing systems. **(06 Marks)**

b. Explain dual mode operation in OS with a neat block diagram. **(04 Marks)**

c. What are system calls? Briefly point out its types. **(04 Marks)**

d. What are virtual machines? Explain with block diagram. Point out its benefits. **(06 Marks)**

2 a. Why is it important for the scheduler to distinguish I/O bound programs from CPU bound programs? **(02 Marks)**

b. What is interprocess communication? Explain its types. **(06 Marks)**

c. Consider the following set of processes, with the length of the CPU burst given in milliseconds.

Process	Burst time	Priority
P_1	10	3
P_2	1	1
P_3	2	3
P_4	1	4
P_5	5	2

The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4, P_5 all at time 0.

(i) Draw the Gantt charts for the following scheduling algorithms, FCFS, SJF and RR (quantum = 1)

(ii) Find out turn around time and waiting time of each process for each of these scheduling algorithm and also find out average turn around time and average waiting time. **(12 Marks)**

3 a. Define Semaphores. Explain its usage and implementation. **(06 Marks)**

b. What are monitors? Explain its usage and implementation. **(08 Marks)**

c. Explain Dining philosophers solution using monitors. **(06 Marks)**

4 a. What are deadlocks? What are its characteristics? **(05 Marks)**

b. Consider the following snapshot of a system:

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P_0	0	0	1	2	0	0	1	2	1	5	2	0
P_1	1	0	0	0	1	7	5	0				
P_2	1	3	5	4	2	3	5	6				
P_3	0	6	3	2	0	6	5	2				
P_4	0	0	1	4	0	6	5	6				

(i) Find out need matrix. **(02 Marks)**

(ii) If a request from process P_1 arrived for (0, 4, 2, 0) can the request be granted immediately? **(02 Marks)**

(iii) Is the system in a safe state? **(06 Marks)**

Explain the process of recovery from deadlock. **(05 Marks)**

PART – B

5 a. Explain the multistep processing of a user program with a neat block diagram. (05 Marks)

b. Distinguish between internal and external fragmentation. (02 Marks)

c. Explain segmentation with an example. (06 Marks)

d. 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 (07 Marks)

6 a. Explain briefly the various operations performed on files. (06 Marks)

b. Explain the various access method of files. (06 Marks)

c. Explain various allocation methods in implementing file systems. (08 Marks)

7 a. Explain the various Disk Scheduling algorithms with example. (10 Marks)

b. Point out and explain briefly the problems with RAID. (05 Marks)

c. Explain Access Matrix method of system protection. (05 Marks)

8 a. Explain the various components of a Linux system. (06 Marks)

b. Explain process scheduling in a linux system. (06 Marks)

c. Explain file systems implementation in linux. (08 Marks)

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CRASH COURSE

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10CS53

Fifth Semester B.E. Degree Examination, May 2017
Operating Systems

Time: 3 hrs. Max. Marks:100

Note: *Answer FIVE full questions, selecting at least TWO questions from each part.*

PART – A

1 a. Explain the advantages of layered approach, with a diagram. (06 Marks)

b. Write the system call sequence to copy a file from source to destination. (07 Marks)

c. With a neat diagram, explain the concept of virtual machines. (07 Marks)

2 a. Explain the process states with diagram. (06 Marks)

b. Explain the different multithreading models, with neat sketches. (06 Marks)

c. Consider the following set of processes. Draw Gantt charts and calculate average waiting time and average turnaround time using non-preemptive SJF and preemptive SJF scheduling algorithms. (08 Marks)

Process	Arrival time (ms)	Burst time (ms)
P_1	0	8
P_2	1	4
P_3	2	9
P_4	3	5

3 a. Explain the critical section problem. List and explain the requirements to be met by a solution to critical section problem. (08 Marks)

b. Describe the monitor solution to the classical dining-philosopher's problem. (08 Marks)

c. What do you mean by a binary semaphore and a counting semaphore? (04 Marks)

4 a. What is deadlock? Explain the necessary conditions for its occurrence. (06 Marks)

b. System consists of five jobs (J_1, J_2, J_3, J_4, J_5) and three resources (R_1, R_2, R_3), Resource type R_1 has 10 instances, resource type R_2 has 5 instances and R_3 has 7 instances. The following snapshot of the system has been taken:

Jobs	Allocation			Maximum			Available		
	R_1	R_2	R_3	R_1	R_2	R_3	R_1	R_2	R_3
J_1	0	1	0	7	5	3	3	3	2
J_2	2	0	0	3	2	2			
J_3	3	0	1	9	0	2			
J_4	2	1	1	2	2	2			
J_5	0	0	2	4	3	3			

(08 Marks)

c. Describe RAG:

i) With deadlock

ii) With a cycle but no deadlock. (06 Marks)

PART – B

5 a. Explain internal and external Fragmentation with examples. (06 Mar
b. Explain with a diagram, how TLB is used to solve the problem of simple paging scheme.
5 c. What is the cause of threshing? How does the system detect thrashing? (08 Mar
(06 Mar

6 a. What is a file? Explain the different allocation methods. (10 Mar
b. Explain different approaches to managing free space on disk storage. (10 Mar

7 a. What is disk scheduling? Explain the following with diagram: i) FCFS; ii) SST
iii) SCAN.
b. What is an access matrix? Explain the following operations in access matrix with
6 example for each: i) Copy; ii) Transfer; iii) Limited copy. (10 Mar
(10 Mar

8 a. Explain the different components of a Linux system.
7 b. Discuss how memory management is dealt with in Linux operating system. (10 Mar
(10 Mar

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10CS53

Fifth Semester B.E. Degree Examination, June/July 2014
Operating System

Time: 3 hrs. Max. Marks:100

Note: *Answer FIVE full questions, selecting atleast TWO question from each part.*

PART – A

2 a. Explain multiprogramming and time sharing operating systems. (08 Marks)
b. List out the different services that an OS provides? Explain any two. (06 Marks)
c. What are the different categories of system program? Explain. (06 Marks)

3 a. With neat diagram, explain components of PCB. (05 Marks)
b. Explain direct and indirect communication with respect to message passing systems. (05 Marks)
c. Consider the following set of processes with CPU burst time (in m secs)

Process	Arrival time	Burst time
P_0	0	6
P_1	1	3
P_2	2	1
P_3	3	4

i) Draw Gantt chart illustrating the execution of above processes using SRTF and non preemptive SJF
ii) Find the turn around time for each processes for SRTF and SJF. Hence show that SRTF is faster than SJF. (10 Marks)

4 a. What do you mean by a binary semaphore and counting semaphore? Explain the implementation of wait( ) and signal( ) semaphore operation. (10 Marks)
b. What is race condition? List the requirements that a solution to critical section must satisfy. (05 Marks)
c. Explain any one synchronization problem for testing newly proposed synchronization scheme. (05 Marks)

5 a. Consider the following snapshot of resource allocation at time t_1

	Allocation			Request			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	1	0	0	0	0	0	0	0
P_1	2	0	0	2	0	2			
P_2	3	0	3	0	0	0			
P_3	2	1	1	1	0	0			
P_4	0	0	2	0	0	2			

i) Show that the system is not deadlocked by generating one safe sequence
ii) At instance t_2, P_2 makes one additional request for instance of type C. Show that the system is deadlocked if the request is granted. Write down the deadlocked processes. (08 Marks)

b. Describe resource allocation graph
i) With deadlock ii) With a cycle but no deadlock. (06 Marks)
c. What is wait for graph? Explain how it is useful for detection of deadlock. (06 Marks)

PART – B

5 a. Explain internal and external fragmentation, with examples.

b. Consider the following page reference string 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7 How many page faults would occur for the following page replacement alg 3 and 5 frames. i) LRU ii) optimal.

c. What is the cause of Thrashing? How does the system detect thrashing?

6 a. What do you mean by free space list? With suitable example, explain an implementation of free space list.

b. What are the three methods for allocating disk space? Explain with suitable

7 a. Suppose that a disk has 50 cylinders named 0 to 49. The R/W head is cu cylinder 15. The queue of pending requests are in order : 4 40 11 35 7 14 current head position, what is the total distance traveled (in cylinders) by satisfy the requests using algorithms FCFS, SSTF and LOOK. Illustrate w case.

b. Write a note on :
   i) Domain of protection
   ii) Access matrix.

8 a. With diagram, explain components of Linux system.

b. Explain in detail, the components that the kernel module support under Linu

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10CS53

Fifth Semester B.E. Degree Examination, Dec.2013/Jan.2014
Operating Systems

Time: 3 hrs. Max. Marks:100

Note: *Answer FIVE full questions, selecting at least TWO questions from each part.*

PART – A

1 a. Explain the advantage of the layered approach with a neat diagram. (06 Marks)
b. What are virtual machines? Explain its advantage with a neat diagram. (08 Marks)
c. What are the essential properties of batch, real time and distributed operating systems? (06 Marks)

2 a. Differentiate between:
i) Process and a thread
ii) Short term and medium term schedules.
iii) User level and kernel level threads.
iv) Waiting and turn around time. (08 Marks)

b. Consider the following set of processes with arrival time:

Process	Burst time	Arrival time
P_1	10	0
P_2	1	0
P_3	2	1
P_4	4	2
P_5	3	2

i) Draw Gantt charts using FCFS, SJF preemptive and non preemptive scheduling. (08 Marks)
ii) Calculate the average waiting time for each of the scheduling algorithm.
c. Describe the actions an operating system takes to context switch between processes. (04 Marks)

3 a. Explain Dining-Philosopher's problem using monitors. (10 Marks)
b. What is race condition? Explain Reader's writer's problem with semaphores. (10 Marks)

4 a. For the following snapshot find the safe sequence using Banker's algorithm:
The number of resource units are R_1, R_2, R_3 which are 7, 7, 10 respectively.

Process	Allocated resources			Maximum requirements		
	R_1	R_2	R_3			
P_1	2	2	3	3	6	8
P_2	2	0	3	4	3	3
P_3	1	2	4	3	4	4

(06 Marks)
b. Explain different methods to recover from deadlock. (06 Marks)
c. Dead lock exists if a cycle exists. Yes or no. Justify your answer with a suitable example. (08 Marks)

PART – B

5 a. Why are translation look-aside bubbles (TLB) important? In a simple paging information is stored in TLB? Explain.

b. Given memory partitions of 100K, 500K, 200K, 300K and 600K, apply first algorithm to place 212K, 417K, 112K and 426K.

c. What is swapping? Does this increase the operating systems overhead? Justify

6 a. What is a file? Explain the different allocation methods.

b. What are directories? Write a brief note on mounting file systems.

c. How is free space managed? Explain.

7 a. Explain the difference between protection and security? Describe the scheme lists to implement protection.

b. Write short notes on:

i) Swap space management.

ii) Revocation of access rights.

8 a. What are the design principles of Linux operating systems? Explain.

b. What do you mean by cloning? How is it achieved in Linux systems?

c. How is IPC handled in Linux? Explain with a suitable example.

10CS53

Semester B.E. Degree Examination, June/July 2013
Operating Systems

Max. Marks:100

Note: *Answer FIVE full questions, selecting at least TWO questions from each part.*

PART – A

1. a. Explain services provided by an operating system that are designed to make using systems more convenient for users. **(08 Marks)**

   b. What is meant by mechanism and policy desirable while designing an operating system? Explain with an example. **(04 Marks)**

   c. With a neat diagram of VM-WARE architecture, explain the concept of Virtual Machine and the main advantage of using VM architecture. **(08 Marks)**

2. a. What is Process Control Block (PCB)? What are the different states in which a process can be? With the help of a state transition diagram, discuss the process life cycle. **(05 Marks)**

   b. Why is CPU scheduling necessary? Discuss the five different scheduling criteria used in comparing scheduling mechanisms. **(06 Marks)**

   c. Consider the following set of processes, with length of the CPU burst time given in milliseconds:

Process	Arrival time	Burst-time	Priority
P_1	0	10	3
P_2	0	1	1
P_3	3	2	3
P_4	5	1	4
P_5	10	5	2

   Draw four Gantt charts illusterating the execution of these processes using FCFS, SJF, preemptive priority and RR (Quantum = 2) scheduling.

   (ii) What is the turn around time of each processes for each of the scheduling algorithms in (i).

   (iii) What is the waiting time of each process for each of the scheduling algorithm in (i). **(09 Marks)**

3. a. Write N-process solution to critical section problem which uses test and test ( ) atomic instruction. Also explain how the algorithm satisfies all the requirements of critical section. **(08 Marks)**

   b. A server may be designed to limit the number of open connections. For example, a sever may want to have only N socket connections at any point in time. As soon as N connections are made, the server will not accept another incoming connection until an existing connection is released. Explain how semaphores can be used by a server to limit the number of concurrent connections. **(04 Marks)**

   c. What is the range of monitors with a schematic view of its structure; write a monitor solution to the bounded-buffer problem. **(08 Marks)**

4. a. What is meant by dead lock? Consider the traffic deadlock depicted in the figure given below. Explain that the four necessary conditions for dead lock indeed hold in this example. **(05 Marks)**

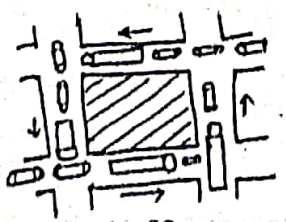

Fig Q.4(a)

b. Consider the following snapshot of a system:

	Allocation	Max	Available
	ABC	ABC	ABC
P_0	002	004	102
P_1	100	201	
P_2	135	137	
P_3	632	842	
P_4	143	157	

Answer the following questions using Banker's algorithm:
Is the system in a "safe state"?
If a request from process P_2 arrives for (002) can the request be granted immediate

c. What are the methods used to handle the dead locks? Explain how circular wait can be prevented from occurring.

PART – B

5 a. What are the drawbacks of contiguous memory allocation? Given five memory pa 100KB, 500KB, 200KB, 300KB and 600KB (in order), how would each of the fir fit and worst fit algorithms place processes of 212 KB, 417 KB, 112KB and 42 order)? Which algorithm makes the most efficient use of memory?

b. Consider a paging system with the page table stored in memory.
   i) If a memory reference takes 200 nano seconds, how long does a paged reference take?
   ii) If we add associative register and 75 percentage of all page table references in the associative registers, what is the effective memory access time? (As finding a page table entry in the associative memory/registers takes zero ti entry is found).

c. Consider the following page reference string: 7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 memory with three frames. How many page faults would occur for LRU, FIFO an page replacement algorithms? Which is the most efficient among them?

6 a. Explain the various file operations supported by the operating system, also di mandatory lock and advisory lock mechanisms used on files by the operating syste

b. Describe the methods used for implementing the directories.

c. Explain various file protection mechanisms.

7 a. Suppose that the disk drive has 5000 cylinders numbered from 0 to 4999. Th currently serving a request at cylinder 143, and the previous request was at cy The queue of pending requests in FIFO order is 86, 1470, 913, 1774, 948, 1 1750, 130. Starting from the current (location) head position, What is the total cylinders) that the disk arm moves to satisfy all the pending requests, for e following disk-scheduling algorithms?
   i) FCFS; ii) SSTF; iii) SCAN; iv) LOCK; v) C-SCAN.

b. Discuss the strengths and weaknesses of implementing an access matrix using that are associated with objects.

8 Write short notes on:
a. Portability issues in LINUX
b. Performance of demand paging
c. Multithreading models
d. Network structure in LINUX.

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10CS53

Semester B.E. Degree Examination, December 2012
Operating Systems

Max. Marks:100

Note: *Answer FIVE full questions, selecting atleast TWO questions from each part.*

PART – A

1. a. distributed operating system? What are the advantages of the distributed operating (06 Marks)
   b. system calls? With examples explain different categories of system calls. (07 Marks)
   c. diagram, explain the concept of virtual machine. (07 Marks)

2. a. the process state transition diagram. (06 Marks)
   b. multithreading models. (09 Marks)
   c. processes listed below, draw Gantt charts using preemptive and non preemptive scheduling algorithm. A larger priority number has a higher priority.

Jobs	Arrival time	Burst time	Priority
J_1	0	6	4
J_2	3	5	2
J_3	3	3	6
J_4	5	5	3

(05 Marks)

3. a. busy waiting in a critical section concept? How semaphore is used to solve critical (10 Marks)
   b. problem? What are the advantages of semaphore? (10 Marks)
   c. a monitor? Explain the solution to the classical dining philosopher's problem, using

4. a. resource allocation graph(RAG)? Explain how RAG is very useful in describing (08 Marks)
   b. trace by considering your own example.
   c. consists of five jobs (J_1, J_2, J_3, J_4, J_5) and three resources (R_1, R_2 R_3). Resource type instances, resource type R_2 has 5 instances and R_3 has 7 instances. The following of the system has been taken :

Jobs	Allocation			Maximum			Available		
	R_1	R_2	R_3	R1	R2	R3	R_1	R_2	R_3
J_1	0	1	0	7	5	3	3	3	2
J_2	2	0	0	3	2	2			
J_3	3	0	1	9	0	2			
J_4	2	1	1	2	2	2			
J_5	0	0	2	4	3	3			

   d. matrix and calculate the safe sequence by using Banker's algorithm. Mention the (08 Marks)
   e. is safe or not safe. (04 Marks)
   f. the methods for handling deadlocks.

PART – B

5 a. Distinguish between :
   i) Logical versus physical address space
   ii) Paging versus segmentation
   iii) First fit and best fit algorithms.

b. Mention the problem with simple paging scheme. How TLB is used to sol
Explain with supporting hardware diagram and with an example.

c. On a system using simple segmentation, compute the physical address for ea
address, logical address is given in the following segment table. If the add
segment fault, indicate it as "segment fault".

Segment	Base	Length
0	330	124
1	876	211
2	111	99
3	498	302

i) 0, 9, 9 ii) 2, 78 iii) 1, 265 iv) 3, 222 c) 0, 111.

6 a. Explain briefly different file types.

b. Explain the different types of directory structures, with examples and
advantages and disadvantages.

c. With supporting diagrams, explain linked and indexed method of allocating d

7 a. Explain the following disk scheduling algorithms in brief
   i) SSTF ii) SCAN iii) LOOK.

b. Explain in brief, the selection of a disk scheduling algorithm.

c. What is protection? Distinguish between mechanisms and policies. Exp
access matrix with domains as objects.

8 Write short notes on (any four):
a. Linux history
b. Linux design principles
c. Components of a Linux system
d. Optimal page replacement algorithm
e. Steps in handling page fault.

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