SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203.

DEPARTMENT OF INFORMATION TECHNOLOGY & COMPUTER SCIENCE AND ENGINEERING

QUESTION BANK

SUBJECT : Operating Systems

SEM / YEAR: IV Sem / II Year

UNIT I - OPERATING SYSTEMS OVERVIEW			
Computer System Overview-Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions, Evolution of Operating System - Computer System Organization- Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.			
PART - A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	Differentiate between tightly coupled systems and loosely coupled systems.	BTL-2	Understanding
2.	List out the various operating system components.	BTL-1	Remembering
3.	Define Operating System.	BTL-1	Remembering
4.	What is the responsibility of kernel?	BTL-1	Remembering
5.	Consider a memory system with a cache access time of 10 ns and a memory access time of 110 ns – assume the memory access time includes the time to check the cache. If the effective access time is 10% greater than the cache access time, what is the hit ratio H?	BTL-4	Analyzing
6.	List out some system calls required to control the communication system.	BTL-4	Analyzing
7.	Differentiate between symmetric and asymmetric multiprocessor.	BTL-1	Remembering
8.	Is OS a resource Manager? If so justify your answer.	BTL-3	Applying
9.	What is meant by system call?	BTL-1	Remembering
10.	What is SYSGEN and system boot?	BTL-2	Understanding
11.	What is the purpose of system programs?	BTL-1	Remembering
12.	Compare and contrast DMA and Cache memory.	BTL-5	Evaluating
13.	Write the differences of batch systems and time sharing systems.	BTL-2	Understanding
14.	Do timesharing differ from multiprogramming? If so, How?	BTL-3	Applying
15.	What are the objectives of operating systems?	BTL-2	Understanding
16.	Why API's need to be used rather than system calls?	BTL-5	Evaluating
17.	How would you build clustered systems?	BTL-6	Creating
18.	What is dual mode operation and what is the need of it?	BTL-4	Analyzing
19.	Illustrate the use of fork and exec system calls.	BTL-3	Applying
20.	What are the advantages of Peer –to- peer system over client -server systems?	BTL-6	Creating
PART - B			

1.	(i)Explain the various types of system calls with an example for each. (8) (ii) Discuss the functionality of system boot with respect to an Operating System. (5)	BTL-5	Evaluating
2.	Illustrate how the operating system has been evolved from serial processing to multiprogramming system. (13)	BTL-3	Applying
3.	(i) Explain the various structure of an operating system. (8) (ii) Describe system calls and system programs in detail with neat sketch. (5)	BTL-1	Remembering
4.	Describe the evolution of operating system. (13)	BTL-2	Understanding
5.	(i).Discuss the pros and cons of simple processor system and multi core system and clustered system. (8) (ii).Explain the steps involved to transfer the stored historical information in a magnetic tapes to the CPU for further processing through various storage devices. (5)	BTL-2	Understanding
6.	State the operating system structure. Describe the operating system operations in detail. Justify the reason why the lack of a hardware supported dual mode can cause serious shortcoming in an operating system? (13)	BTL-6	Creating
7.	Explain the different architecture of OS starting from simple structure, layered structure, micro kernels, modules and hybrid systems, with suitable examples OS structure, including Google's Android. (13)	BTL-3	Applying
8.	(i)Discuss about the evolution of virtual machines. Also explain how virtualization could be implemented in Operating Systems. (7) (ii)Discuss the different multiprocessor organizations with block diagrams. (6)	BTL-2	Understanding
9.	(i) Explain the various memory hierarchies with neat block diagram. (7) (ii) Explain interrupts in detail. (6)	BTL-1	Remembering
10.	How computer system handles interrupts? Discuss how interrupts can be handled quickly. (13)	BTL-4	Analyzing
11.	(i)Distinguish between the client server and peer to peer models of distributed systems. (7) (ii)Describe three general methods for passing parameters to the OS with example. (6)	BTL-1	Remembering
12.	Discuss the essential properties of the following types of systems. (i) Time sharing systems. (4) (ii) Multi-processor systems. (4) (iii) Distributed systems. (5)	BTL-1	Remembering
13.	Explain cache memory and its mapping. (13)	BTL-4	Analyzing
14.	(i) How could a system be designed to allow a choice of operating systems from which to boot? What would the bootstrap program need to do? (8) (ii) Discuss about Direct memory access. (5)	BTL-4	Analyzing
	PART - C		
1.	(i) With neat sketch discuss computer system overview. (8) (ii) Enumerate the different operating system structure and explain with neat sketch. (7)	BTL-6	Creating
2.	(i)State the basic functions of OS and DMA. (5) (ii)Explain system calls system programs and OS generation. (10)	BTL-5	Evaluating

3.	(i) Describe a mechanism for enforcing memory protection in order to prevent a program from modifying the memory associated with other programs. (8) (ii) What are the advantages and disadvantages of using the same system call interface for manipulating both files and devices? (7)	BTL-5	Evaluating
4.	(i) Describe in detail about multicore organization. (8) (ii) Computer system architecture deals about how the component of a computer system may be organized? Discuss detail about different architecture of a computer system. (7)	BTL-4	Analyzing

UNIT II - PROCESS MANAGEMENT

Processes – Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication; CPU Scheduling – Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real time scheduling; Threads- Overview, Multithreading models, Threading issues; Process Synchronization – The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Critical regions, Monitors; Deadlock – System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

PART - A

Q.No	Questions	BT Level	Competence
1.	Name and draw five different process states with proper definition.	BTL-1	Remembering
2.	Define the term 'Dispatch Latency'.	BTL-1	Remembering
3.	Is the context switching an overhead? Justify your answer.	BTL-4	Analyzing
4.	Distinguish between CPU bounded and I/O bounded processes.	BTL-2	Understanding
5.	Why is IPC needed? Name the two fundamental models of IPC.	BTL-1	Remembering
6.	Give an programming example in which multithreading does not provide better performance than a single -threaded solutions.	BTL-4	Analyzing
7.	What are the benefits of synchronous and asynchronous communication?	BTL-3	Applying
8.	Differentiate single threaded and multi-threaded processes.	BTL-4	Analyzing
9.	Differentiate preemptive and non-preemptive scheduling.	BTL-2	Understanding
10.	List out the data fields associated with Process Control Blocks.	BTL-6	Creating
11.	"Priority inversion is a condition that occurs in real time systems where a low priority process is starved because higher priority processes have gained hold of the CPU" – Comment on this statement.	BTL-5	Evaluating
12.	What is meant by 'starvation' in operating system?	BTL-2	Understanding
13.	What is the concept behind strong semaphore and spinlock?	BTL-3	Applying
14.	Give the queueing diagram representation of process scheduling	BTL-2	Understanding
15.	What is the meaning of the term busy waiting?	BTL-5	Evaluating
16.	Elucidate mutex locks with its procedure.	BTL-1	Remembering
17.	Under what circumstances would a user be better off using a timesharing system rather than a PC or single –user workstation?	BTL-3	Applying
18.	What are the differences between user level threads and kernel level threads? Under what circumstances is one type better than the other?	BTL-5	Evaluating
19.	"If there is a cycle in the resource allocation graph, it may or may not be in deadlock state". Comment on this statement.	BTL-6	Creating
20.	List out the methods used to recover from the deadlock.	BTL-1	Remembering

<table>
<tr><th colspan="4">PART – B</th></tr>
<tr><td>1.</td><td>(i) Explain why interrupts are not appropriate for implementing synchronous primitives in multiprocessor systems. (8)
(ii) Compute the average waiting time for the processes using non-preemptive SJF scheduling algorithm. (5)
<table>
<tr><th>Process</th><th>Arrival time</th><th>Burst time</th></tr>
<tr><td>P1</td><td>0</td><td>7</td></tr>
<tr><td>P2</td><td>2</td><td>4</td></tr>
<tr><td>P3</td><td>4</td><td>1</td></tr>
<tr><td>P4</td><td>5</td><td>4</td></tr>
<tr><td>P5</td><td>3</td><td>4</td></tr>
</table></td><td>BTL-4</td><td>Analyzing</td></tr>
<tr><td>2.</td><td>Describe the differences among short- term, medium-term and long-term scheduling with suitable example. (13)</td><td>BTL1</td><td>Remembering</td></tr>
<tr><td>3.</td><td>(i) What is a process? Discuss components of process and various states of a process with the help of a process state transition diagram. (8)
(ii) Write the difference between user thread and kernel thread. (5)</td><td>BTL2</td><td>Understanding</td></tr>
<tr><td>4.</td><td>Discuss how the following pairs of scheduling criteria conflict in certain settings.
i. CPU utilization and response time. (4)
ii. Average turnaround time and maximum waiting time. (5)
iii. I/O device utilization and CPU utilization. (4)</td><td>BTL1</td><td>Remembering</td></tr>
<tr><td>5.</td><td>(i) Discuss the actions taken by a kernel to context-switch between processes. (7)
(ii) Provide two programming examples in which multithreading does not provide better performance than a single threaded solution. (6)</td><td>BTL3</td><td>Applying</td></tr>
<tr><td>6.</td><td>Consider the following set of processes with the length of the CPU-burst time in given ms:
<table>
<tr><th>Process</th><th>Burst Time</th><th>Arrival time</th></tr>
<tr><td>P1</td><td>8</td><td>0</td></tr>
<tr><td>P2</td><td>4</td><td>1</td></tr>
<tr><td>P3</td><td>9</td><td>2</td></tr>
<tr><td>P4</td><td>5</td><td>3</td></tr>
<tr><td>P5</td><td>3</td><td>4</td></tr>
</table>
Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, priority and RR(quantum=2)scheduling. Also calculate waiting time and turnaround time for each scheduling algorithms. (13)</td><td>BTL3</td><td>Applying</td></tr>
<tr><td>7.</td><td>Explain the differences in the degree to which the following scheduling algorithms discriminate in favor of short processes:
(i) RR (7)
(ii) Multilevel feedback queues. (6)</td><td>BTL-4</td><td>Analyzing</td></tr>
<tr><td>8.</td><td>Outline a solution using semaphores to solve dinning philosopher problem. (13)</td><td>BTL-5</td><td>Evaluating</td></tr>
<tr><td>9.</td><td>(i)Show how wait() and signal() semaphore operations could be implemented in multiprocessor environments, using Test and Set instructions. The solution should exhibit minimal busy waiting. Develop pseudo code for implementing operations. (7)
(ii)Discuss about issues to be considered with multithreaded programs.(6)</td><td>BTL6</td><td>Creating</td></tr>
<tr><td>10.</td><td>Explain Deadlock detection with suitable example. (13)</td><td>BTL-4</td><td>Analyzing</td></tr>
</table>

<table>
<tr><td>11.</td><td>Consider the snapshot of a system. (13)

<table>
<tr><th></th><th>Max
A B C D</th><th>Allocation
A B C D</th><th>Available
A B C D</th></tr>
<tr><td>P0</td><td>2 0 0 1</td><td>4 2 1 2</td><td>3 3 2 1</td></tr>
<tr><td>P1</td><td>3 1 2 1</td><td>5 2 5 2</td><td></td></tr>
<tr><td>P2</td><td>2 1 0 3</td><td>2 3 1 6</td><td></td></tr>
<tr><td>P3</td><td>1 3 1 2</td><td>1 4 2 4</td><td></td></tr>
<tr><td>P4</td><td>1 4 3 2</td><td>3 6 6 5</td><td></td></tr>
</table>
Answer the following Using Banker’s algorithm,
(i) illustrate that the system is in safe state by demonstrating an order in which the processes may complete?
(ii)If a request from process P1 arrives for(1,1,0,0) can the request be granted immediately?
(iii)if the request from p4 arrives for(0,0,2,0) can the request be granted immediately?</td><td>BTL2</td><td>Understanding</td></tr>
<tr><td>12.</td><td>(i) Explain thread and SMP management. (4)
(ii) Illustrate semaphores with neat example. (4)
(iii) The operating system contains 3 resources, the number of instance of each resource type are 7,7,10. The current resource allocation state is as shown below.
<table>
<tr><th rowspan="2">Process</th><th colspan="3">Current Allocation</th><th colspan="3">Maximum need</th></tr>
<tr><th>R1</th><th>R2</th><th>R3</th><th>R1</th><th>R2</th><th>R3</th></tr>
<tr><td>P1</td><td>2</td><td>2</td><td>3</td><td>3</td><td>6</td><td>8</td></tr>
<tr><td>P2</td><td>2</td><td>0</td><td>3</td><td>4</td><td>3</td><td>3</td></tr>
<tr><td>P3</td><td>1</td><td>2</td><td>4</td><td>3</td><td>4</td><td>4</td></tr>
</table>
Is the current allocation in a safe state? (5)</td><td>BTL1</td><td>Remembering</td></tr>
<tr><td>13.</td><td>(i)Explain the dining philosophers critical section problem solution using monitor. (8)
(ii)Write the algorithm using test-and –set () instruction that satisfy all the critical section requirements. (5)</td><td>BTL2</td><td>Understanding</td></tr>
<tr><td>14.</td><td>(i) Is it possible to have concurrency but not parallelism? Explain. (6)
(ii) Consider a system consisting of four resources of the same type that are shared by three processes, each of which needs at most two resources. Show that the system is deadlock free. (7)</td><td>BTL-3</td><td>Applying</td></tr>
<tr><td colspan="4">PART - C</td></tr>
<tr><td>1.</td><td>Which of the following scheduling algorithms could result in starvation?
(i)First-come, first-served (5)
(ii) Shortest job first. (5)
(iii) Round robin (5)
Detail with Justification.</td><td>BTL-6</td><td>Creating</td></tr>
</table>

2.	(i).Consider the following set of processes with the length of CPU burst time given in milliseconds. **Process** / **Burst Time** / **priority** / **Arrival Time** P1 / 10 / 3 / 0 P2 / 1 / 1 / 1 P3 / 2 / 3 / 2 P4 / 1 / 4 / 1 P5 / 5 / 2 / 2 Draw the Gantt chart for the execution of these processes using FCFS, SJF, SRTS, pre-emptive and non pre-emptive priority and Round robin with the time slice of 2ms, Find average waiting time and turnaround time using each of the methods. (10). (ii).Explain –multi level queue and multi level feedback queue scheduling with suitable examples. (5)	BTL-5	Evaluating
3.	Consider a system consisting of 'm' resources of the same type, being shared by 'n' processes. Resources can be requested and released by processes only one at a time. Show that the system is deadlock free if the following two conditions hold: (15) a) The maximum need of each process is between 1 and m resources b) The sum of all maximum needs is less than m+n.	BTL-4	Analyzing
4.	Consider the following system snapshot using data structures in the Banker's algorithm with resources A,B,C and D and process P0 to P4: Max / Allocation / Available / Need A B C D / A B C D / A B C D / A B C D P0 6 0 1 2 / 4 0 0 1 / 3 2 1 1 P1 1 7 5 0 / 1 1 0 0 P2 2 3 5 6 / 1 2 5 4 P3 1 6 5 3 / 0 6 3 3 P4 1 6 5 6 / 0 2 1 2 Using Banker's algorithm, answer the following questions: (i)How many resources of type A,B,C and D are there? (3) (ii)What are the contents of the need matrix? (3) (iii)Is the system in a safe state? Why? (3) (iv)If a request from process P4 arrives for additional resources of (1,2,0,0) can the banker's algorithm grant the request immediately? Show the new system state and other criteria. (6)	BTL-5	Evaluating

UNIT III - STORAGE MANAGEMENT			
Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging, 32 and 64 bit architecture Examples; Virtual Memory – Background, Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.			
PART - A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	Name any two differences between logical and physical addresses.	BTL-2	Understanding
2.	Differentiate paging and segmentation.	BTL-2	Understanding
3.	What is the purpose of paging the page tables?	BTL-4	Analyzing
4.	What is a working set model?	BTL-1	Remembering

5.	In memory management consider the program named as Stack1 which size is 100 KB. This program is loaded in the main memory from 2100 to 2200KB. Show the contents of the page map table for the given scenario.	BTL-6	Creating
6.	What are the counting based page replacement algorithm?	BTL-1	Remembering
7.	Will optimal page replacement algorithm suffer from Belady's anomaly? Justify your answer.	BTL-5	Evaluating
8.	State the effect of Thrashing in an operating system.	BTL-2	Understanding
9.	What is thrashing? and how to resolve this problem?	BTL-1	Remembering
10.	What is meant by address binding? Mention the different types.	BTL-1	Remembering
11.	Write about swapping. Let us assume the user process is of size 1MB and the backing store is a standard hard disk with a transfer rate of 5 MBPS. Calculate the transfer rate.	BTL-5	Evaluating
12.	How does the system detect thrashing?	BTL-4	Analyzing
13.	Consider the following Segmentation 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 logical addresses 3400 and 0110?	BTL-5	Evaluating
14.	What do you mean by compaction? In which situation is it applied?	BTL-3	Applying
15.	Consider the following page-reference string: 1,2,3,4,5,6,7,8,9,10,11,12. How many page faults and page fault ratio would occur for the FIFO page replacement algorithm? Assuming there is four frames.	BTL-1	Remembering
16.	What is meant by pre paging? Is it better than demand paging?	BTL-6	Creating
17.	Define external fragmentation.	BTL-1	Remembering
18.	Define demand paging in memory management. What are the steps required to handle a page fault in demand paging?	BTL-4	Analyzing
19.	Mention the significance of LDT and GDT in segmentation.	BTL-3	Applying
20.	Why are page sizes always powers of 2?	BTL-3	Applying
	PART - B		
1.	What is demand paging? Describe the process of demand paging in OS. (13)	BTL-2	Understanding
2.	(i)With a neat sketch, explain how logical address is translated into physical address using Paging mechanism. (7) (ii)Write short notes on memory-mapped files . (6)	BTL-1	Remembering
3.	Explain why sharing a reentrant module is easier when segmentation is used than when pure paging is used with example. (13)	BTL-3	Applying
4.	(i).Discuss about free space management on I/O buffering and blocking. (7) (ii).Discuss the concept of buddy system allocation with neat sketch. (6)	BTL-5	Evaluating
5.	Discuss situation under which the most frequently used page replacement algorithm generates fewer page faults than the least recently used page replacement algorithm. Also discuss under which circumstances the opposite holds. (13)	BTL-2	Understanding

6.	When do page faults occur? Consider the reference string: 1,2,3,4,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6. How many page faults and page fault rate occur for the FIFO, LRU and optimal replacement algorithms, assuming one, two, three, four page frames? (13)	BTL-6	Creating
7.	(i) Given memory partitions of 500 KB, 100 KB, 300 KB, 200 KB and 600 KB in order, how would each of the first-fit, best-fit, and worst-fit algorithms place processes of size 418 KB, 202 KB, 506 KB,11 2 KB, and 95 KB (in order)? Which the algorithms make the most efficient use of memory? (7) (ii) Differentiate external fragmentation with internal fragmentation.(6)	BTL-4	Analyzing
8.	Compare paging with segmentation in terms of the amount of memory required by the address translation structures in order to convert virtual addresses to physical addresses. (13)	BTL-1	Remembering
9.	(i) Explain in detail about thrashing. (7) (ii) Explain in detail about allocation of kernel memory. (6)	BTL-1	Remembering
10.	Draw the diagram of segmentation memory management scheme and explain its principle. (13)	BTL-3	Applying
11.	(i)Under what circumstances do page faults occur? Describe the actions taken by the operating system when a page fault occurs. (7) (ii)Discuss situations in which the least frequently used (LFU) page replacement algorithm generates fewer page fault than the least recently used (LRU) page replacement algorithm. Also Discuss under what circumstances the opposite holds good. (6)	BTL-4	Analyzing
12.	(i)Explain the global and local frame allocation algorithms and their pros and cons. (3) (ii)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,assuming 1 and 3 free frames.Remember that all the frames are initially empty so that first unique page request will all cost one fault each.LRU replacement, FIFO, Optimal replacement,LFU,MFU. (10)	BTL-4	Analyzing
13.	Discuss the given memory management techniques with diagrams. (i)Partition Allocation Methods (7) (ii)Paging and Translation Look-aside Buffer. (6)	BTL-2	Understanding
14.	(i)Consider a computer system with 16 bit logical address and 4KB page size. The system support upto 1 MB of physical memory. Assume that the actual address size is only 33KB,Page table base register contains 1000.and free frame list contains 13,11,9,7,5,3,1,2,4,6,8. Construct physical and logical memory structures, page table of the corresponding process. Find the physical address of 13,256 and another logical address with page number 2 and offset of 128. Discuss about the possible valid-invaild bit and possible protection bits in page table. (8) (ii) Consider a paging system with page table stored in memory (1) If a memory reference takes 50ns how long does a paged memory referenced take? (2) If we add TLB and 75% of all page table reference are found in TLB, what is the effective memory reference time?(Assume that find a page entry in TLB takes 2ns,if entry is present) . (5)	BTL-1	Remembering
PART – C			

1.	Consider the following page reference string: 1, 2, 3, 4, 5, 3,4,1,6,7,8,7, 8, 9, 7, 8, 9, 5, 4, 4, 5, 3 How many page faults would occur for the following replacement algorithms, assuming four frames? Remembering all frames are initially empty. (15) (a) LRU replacement (b) FIFO replacement (c) Optimal replacement.	BTL5	Evaluating
2.	(i) Explain in detail about paging in 32-bit and 64-bit architectures (5) (ii)Consider a system that allocated pages of different sizes to its processes. What are the advantages of such a paging scheme? What are modifications to the virtual memory system provide this functionality? (10)	BTL-6	Creating
3.	(i) Consider the following page reference string: 1,2, 3, 2, 5, 6, 3, 4, 6, 3, 7, 3, 1, 5, 3, 6, 3, 4, 2, 4, 3, 4, 5, 1 Indicate page faults and calculate total number of page faults and successful ratio for FIFO, optimal and LRU algorithms. Assume there are four frames and initially all the frames are empty. (12) (ii)Explain the effect of thrashing. (3)	BTL5	Evaluating
4.	(i) Explain the difference between internal and external fragmentation. (7) (ii)Discuss situations in which the most frequently used (MFU) page replacement algorithm generates fewer page faults than the least recently used (LRU) page-replacement algorithm. Also discuss under what circumstances the opposite holds. (8)	BTL4	Analyzing

UNIT IV - FILE SYSTEMS AND I/O SYSTEMS

Mass Storage system – Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management, swap space management; File-System Interface – File concept, Access methods, Directory Structure, Directory organization, File system mounting, File Sharing and Protection; File System Implementation- File System Structure, Directory implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery; I/O Systems – I/O Hardware, Application I/O interface, Kernel I/O subsystem, Streams, Performance.

PART - A

Q.No	Questions	BT Level	Competence
1.	Compare the various file access methods.	BTL-5	Evaluating
2.	How does DMA increase system concurrency?	BTL-4	Analyzing
3.	Enlist different types of directory structure.	BTL-3	Applying
4.	If the average page faults service time of 25 ms and a memory access time of 100 ns. Calculate the effective access time.	BTL-4	Analyzing
5.	List out the major attributes and operations of a file system.	BTL-1	Remembering
6.	What is relative block number?	BTL-3	Applying
7.	Do FAT file system advantageous? Justify your answer?	BTL-4	Analyzing
8.	Suppose that the disk rotates at 7200rpm. (i)What is the average rotational latency of the disk drive? (ii) Identify seek distance can be covered in the time?	BTL-3	Applying
9.	Define rotational latency.	BTL-1	Remembering
10.	Define UFD and MFD.	BTL-1	Remembering
11.	Give the disadvantages of Contiguous allocation.	BTL-2	Understanding
12.	Why is it important to scale up system bus and device speeds as CPU speed increases?	BTL-6	Creating

13.	Differentiate between file and directory.	BTL-1	Remembering
14.	What is SSD.	BTL-2	Understanding
15.	Write Short notes on file system mounting.	BTL-2	Understanding
16.	What is the advantage of bit vector approach in free space management?	BTL-1	Remembering
17.	Why rotational latency is usually not considered in disk scheduling?	BTL-1	Remembering
18.	A disk has 26310 cylinders, 16 tracks and 63 sectors. The disk spins at 7200 rpm. Seek time between adjacent tracks is 1 ms. How long does it take to read the entire disk?	BTL-5	Evaluating
19.	Identify the two important function of virtual File System (VFS) layer in the concept of file system implementation.	BTL-6	Creating
20.	State the typical bad-sector transactions.	BTL-2	Understanding
	PART - B		
1.	Describe in detail about file sharing and protection. (13)	BTL-1	Remembering
2.	(i) Explain about kernel I/O subsystems and transforming I/O to hardware operations. (7) (ii)On a disk with 1000 cylinders, numbers 0 to 999, compute the number of tracks, the disk arm must move to satisfy the entire requests in the disk queue. Assume the last request service was at track 345 and the head is moving toward track 0. The queue in FIFO order contains requests for the following tracks: 123, 874, 692, 475, 105, and 376. Find the seek length for the following scheduling algorithm. (6) a) SSTF b) LOOK c) CSCAN	BTL-6	Creating
3.	Explain about the RAID structure in disk management with various RAID levels of organization in detail. (13)	BTL-5	Evaluating
4.	(i)Describe with a neat sketch about the various directory structure. (7) (ii)Describe in detail about free space management with neat examples.(6)	BTL-1	Remembering
5.	(i) Discuss about the various file access methods. (7) (ii)With neat sketch explain about the: (6) a) Directory structure b) File sharing	BTL-2	Understanding
6.	Suppose that the disk drive has 5000 cylinders number 0 to 4999. The drive is serving a request at cylinder 143. The queue of pending request in FIFO order is: 86,1470,913,1774,948,1509.1022,1750,130 starting from the head position, what is the total distance (cylinders) that the disk arm moves to satisfy all the pending requests for each of the disk scheduling algorithms? FCFS,SSTF,SCAN ,LOOK,C-SCAN, C-LOOK. Explain the pros and cons of all disks scheduling algorithms (13)	BTL-2	Understanding
7.	Illustrate an application that could benefit from operating system support for random access to indexed files. (13)	BTL-3	Applying
8.	Consider a file system where a file can be deleted and its disk space Reclaimed while links to that file still exist. What problems may occur if a new file is created in the same storage area or with the same absolute path name? How can these problems be avoided? (13)	BTL-3	Applying
9.	State and explain the FCFS, SSTF and SCAN disk scheduling with examples. (13)	BTL-4	Analyzing
10.	(i) Why is it important to balance file system I/O among the disks and controllers on a system in a multitasking environment? (6) (ii) Discuss the advantages and disadvantages of supporting links to files that cross mount points. (7)	BTL-2	Understanding

11.	(i)Explain in detail the various allocation methods with their pros and cons. (8) (ii)Brief the various procedures need to be followed in disk management. (5)	BTL-1	Remembering
12.	(i)Explain why logging metadata updates ensures recovery of a file system after a file-system crash. (7) (ii)Explain the issues in designing a file system. (6)	BTL-4	Analyzing
13.	Examine in detail about Directory and disk structure. (13)	BTL-4	Analyzing
14.	(i)In a variable partition scheme, the operating system has to keep track of allocated and free space. Suggest a means of achieving this. Describe the effects of new allocations and process terminations in your suggested scheme. (5) (ii) What are different allocation methods in disk storage? Explain with neat sketch. (8)	BTL-1	Remembering
PART – C			
1.	On a disk with 200 cylinders, numbered 0 to199. Compute the number of tracks the disk arm must move to satisfy the entire request in the disc queue. Assume the last request received at track 100. The queue in FIFO order contains requests for the following tracks 55, 58, 39, 18, 90, 160, 150, 38, 184. Perform the computation to find the seek time for the following disk scheduling algorithms. (15) (a)FCFS (b) SSTF (c) SCAN (d) C-SCAN (e) LOOK	BTL-6	Creating
2.	(i) Describe some advantages and disadvantages of using SSDs as a caching tier and as a disk-drive replacement compared with using only magnetic disks. (8) (ii) Discuss how performance optimizations for file systems might result in difficulties in maintaining the consistency of the systems in the event of computer crashes. (7)	BTL-5	Evaluating
3.	(i)Discuss the functions of files and file implementation. (8) (ii)Explain free space management with neat example. (7)	BTL-4	Analyzing
4.	(i) Distinguish between a STREAMS driver and a STREAMS module.(8) (ii) Could a RAID Level 1 organization achieve better performance for read requests than a RAID Level 0 organization? If so, how? Explain. (7)	BTL-5	Evaluating

UNIT V - CASE STUDY

Linux System – Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, Input-Output Management, File System, Inter-process Communication; Mobile OS – iOS and Android – Architecture and SDK Framework, Media Layer, Services Layer, Core OS Layer, File System.

PART - A

Q.No	Questions	BT Level	Competence
1.	Give the design principles of LINUX system.	BTL-2	Understanding
2.	Mention the various components of a Linux System.	BTL-2	Understanding
3.	Illustrate the components of kernel modules.	BTL-1	Remembering
4.	What is andriod studio SDK?	BTL-1	Remembering
5.	Why is buffering important for accessing I/O devices?	BTL-4	Analyzing
6.	Define hypervisor.	BTL-1	Remembering
7.	What are the two components of hypervisor?	BTL-2	Understanding
8.	Compare the types of hypervisor?	BTL-4	Analyzing
9.	What are the three core standards layers?	BTL-1	Remembering

10.	State the importance of scheduling.	BTL-6	Creating
11.	Why do processes need management?	BTL-2	Understanding
12.	List different ways the OS handles memory management	BTL-1	Remembering
13.	How media layer is different from service layer?	BTL-6	Creating
14.	Mention any two features of Linux file systems.	BTL-3	Applying
15.	Lists two reasons for implementing inter-process communication systems	BTL-3	Applying
16.	Explain guest operating system.	BTL-4	Analyzing
17.	Mention the importance of a Kernel in LINUX Operating system.	BTL-5	Evaluating
18.	What is the difference between preemptive and non-preemptive scheduling?	BTL-1	Remembering
19.	List the advantages of Linux OS.	BTL-3	Applying
20.	Summarize the three layers of networking in LINUX kernel.	BTL-5	Evaluating
	PART – B		
1.	Explain the architecture of iOS.Discuss the media and service layers clearly. (13)	BTL-5	Evaluating
2.	Discuss process management and scheduling in LINUX. (13)	BTL-2	Understanding
3.	Illustrate some existing SDK architecture implementation frameworks. (13)	BTL-3	Applying
4.	Describe about the network structure of LINUX system. (13)	BTL-2	Understanding
5.	(i) What are the three fundamental ways for performing I/O? (3) (ii)Explain each of them and describe what one improves on the other. (10)	BTL-1	Remembering
6.	Explain in detail the design principles, kernel modules in LINUX system. (13)	BTL-1	Remembering
7.	Demonstrate the functions of the kernel, service and command layers of OS. (13)	BTL-3	Applying
8.	Generalize the importance of memory management in Operating system. (13)	BTL-6	Creating
9.	Explain in detail about file system management done in LINUX. (13)	BTL-4	Analyzing
10.	Discuss the process and memory management in Linux. (13)	BTL-1	Remembering
11.	Summarize Inter Process Communication with suitable example. (13)	BTL-2	Understandin
12.	Analyze: (i)mobile OS (5) (ii) desktop OS (4) (iii) multi-user OS (4)	BTL-4	Analyzing
13.	Compare and contrast Andriod OS and IOS. (13)	BTL-4	Analyzing
14.	Explain in detail about Linux architecture. (13)	BTL-1	Rememberin
	PART – C		
1.	Describe an indexed file system and an indexed sequential file system. In what cases is an indexed file system superior, and in what cases is an indexed sequential file system superior? (15)	BTL-6	Creating
2.	Summarize the features and security aspects in Linux. (15)	BTL-5	Evaluating
3.	Compare the functions of media layer, service layer and core OS layer. (15)	BTL-4	Analyzing
4.	Prepare the steps for installing LINUX Operating system. (15)	BTL-6	Creating