SRM VALLIAMMAI ENGINEERING COLLEGE
(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF INFORMATION TECHNOLOGY

QUESTION BANK

III SEMESTER

1908007– OPERATING SYSTEMS CONCEPTS

Regulation – 2019

Academic Year 2022 – 2023(Even Semester)

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE

QUESTION BANK

SUBJECT : 1908007– Operating Systems Concepts

SEM/YEAR : III / II

UNIT – I: PROCESSES AND THREADS

Introduction to operating systems – OBJECTIVES: and functions, Evolution of Operating System - operating system-structures – system calls – system programs – System Generation and system boot Processes: Process concept – Process scheduling – Operations on processes –Inter process communication – Communication in client-server systems. Threads: Multi-threading models – Threading issues. Case study: IPC in Linux, Pthreads library

PART – A

Q.No.	Questions	BT Level	Competence
1	What are the 3 main purposes of an Operating System?	BTL1	Remembering
2	What is an Operating System?	BTL1	Remembering
3	List out the various operating system components.	BTL1	Remembering
4	List two programming examples of multithreading giving improved performance over a single-threaded solution.	BTL1	Remembering
5	List the five major activities of an operating system in regard to process management	BTL1	Remembering
6	What are threads?	BTL1	Remembering
7	Give the information that is kept in process control block	BTL2	Understanding
8	Infer the co-operating process	BTL2	Understanding
9	Outline the different differences between user level threads & Kernel supported threads	BTL2	Understanding
10	Compare tightly coupled systems with loosely coupled systems	BTL2	Understanding
11	Is OS are source Manager? If yes justify your answer.	BTL3	Applying
12	Illustrate how time sharing different from multiprogramming?	BTL3	Applying
13	Identify the use of fork and exec system calls.	BTL3	Applying
14	Analyze the dual mode operation and its need?	BTL4	Analyzing
15	Differentiate DMA and Cache memory	BTL4	Analyzing
16	Analyze some system calls which is required to control the communication system	BTL4	Analyzing
17	Judge How can a user program disturb the normal operation of the system	BTL5	Evaluating
18	Assess the use of inter process communication	BTL5	Evaluating
19	Can a multithreaded solution using multiple user-level threads achieve better performance on a multiprocessor system than on a single processor system?	BTL6	Creating
20	Some computer systems do not provide a privileged mode of operation in hardware. Is it possible to construct a secure operating system for these computer systems?	BTL6	Creating
21	Define Threats	BTL1	Remembering
22	How the kernel supports to the threads.	BTL1	Remembering

23	What are services provides by the operating systems	BTL1	Remembering
24	Define DMA.	BTL1	Remembering
	PART – B		
1	Recall the different architectures of OS starting from simple structure, layered structure, micro kernels, modules and hybrid system with suitable example OS structures including Google's Android. (13)	BTL1	Remembering
2	What are the advantages and disadvantages of using the same system call interface for both files and devices? (13)	BTL1	Remembering
3	Discuss the essential properties of the following types of systems i) Time sharing systems (4) ii) Multi-processor systems (4) iii) Distributed systems(5)	BTL1	Remembering
4	What are the primary goals of conflict-resolution mechanisms used by the Linux kernel for loading kernel modules? (13)	BTL1	Remembering
5	Describe the differences between symmetric and asymmetric multiprocessing. What are three advantages and one disadvantage of multiprocessor systems? (13)	BTL2	Understanding
6	(i)Summarize about the functions of Operating Systems in detail. (7) (ii)Summarize the different multiprocessor organizations with block diagrams. (6)	BTL2	Understanding
7	Describe the cache memory and its mapping in detail. (13)	BTL2	Understanding
8	(i) Distinguish multiprogramming and time-sharing environment. (7) (ii) In a multiprogramming and time-sharing environment, several users share the system simultaneously. This situation can result in various security problems. a. What are two such problems? (3) b. Can we ensure the same degree of security in a time-shared machine as in a dedicated machine? Explain your answer. (3)	BTL3	Applying
9	Illustrate Multithreading models in detail. (13)	BTL3	Applying
10	Demonstrate the three methods for passing parameters to the OS with examples. (13)	BTL3	Applying
11	i) Elaborate threads in detail? How do they differ from a process? (7) ii) Explain the difference in process level switching and thread level switching. (6)	BTL4	Analyzing
12	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? (13)	BTL4	Analyzing
13	(i)Evaluate the various types of system calls with an example for each. (6) (ii)Evaluate the functionality of system boot with respect to an Operating System. (7)	BTL5	Evaluating
14	State the operating system structure and its operations in detail. Justify the reason why the lack of a hardware supported dual mode can cause serious short coming in an operating system? (13)	BTL6	Creating
15	Write the short notes on i. Main Memory. (7) ii. Cache Memory. (6)	BTL3	Applying
16	Discuss about the Multiprogramming. (13)	BTL1	Remembering
17	Elaborate the functionalities of Operating Systems. (13)	BTL4	Analyzing
	PART – C		

1	Give reasons why caches are useful. What problems do they solve and cause? If a catch can be made as large as the device for which it is catching why not make it that large and eliminate the device? (15)	BTL6	Creating
2	(i) With neat sketch discuss computer system overview. (8) (ii)Enumerate the different operating system structure and explain with neat sketch. (7)	BTL6	Creating
3	(i)Evaluate a thread creation and termination with example program and state how many threads does a process have? (10) (ii)How threads are created in Linux? Does Linux use threads?(5)	BTL5	Evaluating
4	(i)List five services provided by an operating system. Explain how each provides convenience to the users. (10) (ii)Explain also in which cases it would be impossible for user-level programs to provide these services. (5)	BTL5	Evaluating
5.	Discuss in detail the booting procedure of operating system and their types. (15)	BTL6	Creating

UNIT - II: PROCESS SCHEDULING AND SYNCHRONIZATION

CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multilevel Queue scheduling - Multilevel feedback Queue Scheduling-Process Synchronization: The critical section problem – Semaphores – Classic problems of synchronization –critical regions. Deadlock: System model – Deadlock characterization – Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance –Deadlock detection – Recovery from deadlock. Case study: Process scheduling in Linux

PART – A

Q.No.	Questions	BT Level	Competence
1	List out different types of CPU Schedulers	BTL1	Remembering
2	What are classical problems of synchronization	BTL1	Remembering
3	What is semaphore? Explain the two primitive operations of semaphore.	BTL1	Remembering
4	Define the terms critical section and mutual exclusion	BTL1	Remembering
5	What is a deadlock?	BTL1	Remembering
6	List the functions of Dispatcher Module.	BTL1	Remembering
7	What are the requirements that a solution to the critical section problem must satisfy?	BTL2	Understanding
8	What are the necessary conditions for deadlock to occur?	BTL2	Understanding
9	Outline the difference between the preemptive and non-preemptive scheduling	BTL2	Understanding
10	Give the queuing diagram representation of process scheduling.	BTL2	Understanding
11	Distinguish between CPU bounded and I/O bounded processes.	BTL3	Applying
12	Under what circumstances would a user be better off using a time sharing system rather than a PC or single–user workstation?	BTL3	Applying
13	Differentiate deadlock and starvation.	BTL3	Applying
14	Explain how resource allocation graph can be used to check for deadlock in a system	BTL4	Analyzing
15	Explain the deadlock avoidance algorithm	BTL4	Analyzing
16	Is the context switching an overhead? Justify your answer.	BTL4	Analyzing
17	Evaluate the concept behind strong semaphore and spinlock?	BTL5	Evaluating
18	Name two hardware instructions and their definitions which can be used for implementing mutual exclusion.	BTL5	Evaluating
19	“If there is a cycle in the resource allocation graph, it may or may not be indeed lock state“. Comment on this statement.	BTL6	Creating
20	“Priority in version 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.	BTL6	Creating

21	Define Deadlock	BTL1	Remembering
22	What is the problem of starvation in OS?	BTL1	Remembering
23	Why the CPU Scheduling is important in Operating System?	BTL1	Remembering
24	Specify the critical regions	BTL2	Understanding
	PART – B		
1	Define CPU utilization, throughput, and turnaround time, waiting time and response time. (13)	BTL1	Remembering
2	What is critical section problem? Write a solution to n process critical section problem. (13)	BTL1	Remembering
3	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)	BTL1	Remembering
4	What is the criterion used to select the time quantum in case of round-robin scheduling algorithm? Explain it with a suitable example. (13)	BTL1	Remembering
5	Outline the Deadlock detection with suitable example. (13)	BTL2	Understanding
6	What is a semaphore and a counting semaphore? Explain how a semaphore can be used so that statement S1 of process P1 is always executed first and only then statement S2of process P2 is executed. (13)	BTL2	Understanding
7	Describe the differences among short- term, medium-term and long-term scheduling with suitable example. (13)	BTL2	Understanding
8	Distinguish between symmetric and asymmetric communication between processes. (13)	BTL3	Applying
9	Explain in detail about the Process scheduling in Linux. (13)	BTL3	Applying
10	Explain the synchronizing protocol of a classical readers/writers problem. Write a symbolic program code to implement any one of the above protocol. (13)	BTL3	Applying
11	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)	BTL4	Analyzing
12	(i)Explain why interrupts are not appropriate for implementing synchronous primitives in multiprocessor systems. (7) (ii)Compute the average waiting time for the processes using non-preemptive SJF scheduling algorithm. (6)	BTL4	Analyzing
13	Consider the snapshot of a system Max / Allocation / Available A B C D / A B C D / A B C D P0 2 0 0 0 / 4 2 1 2 / 3 3 2 1 P1 3 1 2 1 / 5 2 5 2 P2 2 1 0 3 / 2 3 1 6 P3 1 3 1 2 / 1 4 2 4 P4 1 4 3 2 / 3 6 6 5 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? (5) (ii) If a request from process P1 arrives for (1,1,0,0)can the request be granted immediately? (4) (iii) If the request from p4 arrives for (0,0,2,0)can the request be granted immediately? (4)	BTL5	Evaluating
14	Consider the set of 5 processes and calculate the turn around and waiting time for the execution of these processes using FCFS, a non-pre-emptive priority and RR (quantum=1) (13)	BTL6	Creating

Process	Burst	Priority	Arrival Time
P1	8	4	0
P2	6	1	2
P3	1	2	2
P4	9	2	1
P5	3	3	3

15	Consider three process, all arriving at time zero, with total execution time of 10, 20 and 30 units respectively. Each process spends the first 20% of execution time doing I/O, the next 70% of time doing computation, and the last 10% of time doing I/O again. The operating system uses a shortest remaining compute time first scheduling algorithm and schedules a new process either when the running process gets blocked on I/O or when the running process finishes its compute burst. Assume that all I/O operations can be overlapped as much as possible. For what percentage of does the CPU remain idle? (13) 1. 0% 2. 10.6% 3. 30.0% 4. 89.4%	BTL6	Creating
16	Consider the set of 4 processes whose arrival time and burst time are given below- If the CPU scheduling policy is Shortest Remaining Time First, calculate the average waiting time and average turnaround time. (13)	BTL6	Creating

Process No.	Arrival Time	Burst Time		
		CPU Burst	I/O Burst	CPU Burst
P1	0	3	2	2
P2	0	2	4	1
P3	2	1	3	2
P4	5	2	2	1

17	Consider the set of 6 processes whose arrival time and burst time are given below-	BTL6	Creating

Process Id	**Arrival time**	**Burst time**
P1	0	7
P2	1	5
P3	2	3

	P4 | 3 | 1 P5 | 4 | 2 P6 | 5 | 1 If the CPU scheduling policy is shortest remaining time first, calculate the average waiting time and average turnaround time. (13)		
	PART – C		
1	Consider the set of 4 processes whose arrival time and burst time are given below- Process No. | Arrival Time | Burst Time (CPU Burst | I/O Burst | CPU Burst) P1 | 0 | 3 | 2 | 2 P2 | 0 | 2 | 4 | 1 P3 | 2 | 1 | 3 | 2 P4 | 5 | 2 | 2 | 1 If the CPU scheduling policy is Shortest Remaining Time First, calculate the average waiting time and average turnaround time.(15)	BTL6	Creating
2	Which of the following scheduling algorithms could result in starvation? Justify in detail. (i)First-come, first-served(5) (ii)Shortest job first(5) (iii)Round robin(5)	BTL6	Creating
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 dead lock free if the following two conditions hold i) The maximum need of each process is between 1and m resources (8) ii)The sum of all maximum needs is less than m + n.(7)	BTL5	Evaluating
4	Consider the following system snapshot using data structures in the Banker's algorithm with resources A, B, C and D and process P0 sto P4: Max ABCD | Allocation ABCD | Available ABCD | Need ABCD P0 6012 | 4001 | 3211 P1 1750 | 1100 P2 2356 | 1254 P3 1653 | 0633 P4 1656 | 0212 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 their quest immediately? Show the new system state and other criteria.(6)	BTL5	Evaluating

5	Consider the set of 5 processes whose arrival time and burst time are given below- **Process Id** / **Arrival time** / **Burst time** P1 / 3 / 1 P2 / 1 / 4 P3 / 4 / 2 P4 / 0 / 6 P5 / 2 / 3 If the CPU scheduling policy is SJF pre-emptive, calculate the average waiting time and average turn around time. (15)	BTL5	Evaluating

UNIT - III: STORAGE MANAGEMENT

Main Memory Management: Background – Swapping – Contiguous memory allocation – Paging – Segmentation – Segmentation with paging. Virtual Memory: Background – Demand paging – Process creation – Page replacement – Allocation of frames – Thrashing. Case Study: Memory management in Linux

PART – A

Q.No.	Questions	BT Level	Competence
1	Define: Belady's anomaly	BTL1	Remembering
2	What is the purpose of paging the page table?	BTL1	Remembering
3	Define Overlays and swapping	BTL1	Remembering
4	Define demand paging in memory management	BTL1	Remembering
5	List the steps required to handle a page fault in demand paging?	BTL1	Remembering
6	Define lazy swapper and pure Demand Paging	BTL1	Remembering
7	How the problem of external fragmentation can be solved	BTL2	Understanding
8	Name two differences between logical and physical addresses.	BTL2	Understanding
9	What are the common strategies to select a free hole from a set of available holes	BTL2	Understanding
10	Outline about virtual memory	BTL2	Understanding
11	What is the basic approach for page replacement	BTL3	Applying
12	Illustrate the use of Valid-Invalid Bits in Paging?	BTL3	Applying
13	What you mean by compaction? In which situation is it applied.	BTL3	Applying
14	Why page sizes are always power of 2?	BTL4	Analyzing
15	Is the problem of external fragmentation can be solved? justify	BTL4	Analyzing
16	How does the system discover thrashing?	BTL4	Analyzing
17	How much virtual memory should I set for 4GB RAM	BTL5	Evaluating
18	Evaluating the maximum number of pages needed If a system supports 16 bit address line and 1K page size.	BTL5	Evaluating
19	Formulate how long a paged memory reference takes if memory reference takes 200 nanoseconds .Assume a paging system with page table stored in memory	BTL6	Creating
20	Program containing relocatable code was created, assuming it would be loaded at address 0. In its code, the program refers to the following addresses: 50,78,150,152,154. If the program is loaded into memory	BTL6	Creating

	starting at location 250, how do those addresses have to be adjusted?		
21	Define Continuous memory allocation	BTL1	Remembering
22	what are the different forms of segmentation?	BTL1	Remembering
23	Differentiate low and high memory allocation	BTL4	Analyzing
24	Discuss the basic states available in process	BTL2	Understanding
	PART – B		
1	Discuss the following page replacement algorithm with an example i) Optimal (7) ii) LRU (6)	BTL1	Remembering
2	When page faults will occur? Discuss the actions taken by operating system during page fault. (13)	BTL1	Remembering
3	Discuss situation under which the most frequently used page replacement algorithm generates fewer page faults than the least frequently used page replacement algorithm. Also discuss under which circumstances the opposite holds. (13)	BTL1	Remembering
4	What is thrashing and explain the methods to avoid thrash. (13)	BTL1	Remembering
5	Describe the LRU page replacement algorithm, assuming there are 3 frames and the page reference string is7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1. Find the number of page faults. (13)	BTL2	Understanding
6	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)	BTL2	Understanding
7	Outline copy-on write feature and under what circumstances it is beneficial? What hardware support is needed to implement this feature? (13)	BTL2	Understanding
8	Explain about the difference between internal fragmentation and external fragmentation. (13)	BTL3	Applying
9	Differentiate local and global page replacement algorithm. (13)	BTL3	Applying
10	Illustrate in detail about the free space management on I/O buffering and blocking. (13)	BTL3	Applying
11	Explain why sharing a reentrant module is easier when segmentation is used than when pure paging is used with example. (13)	BTL4	Analyzing
12	Why are segmentation and paging sometimes combined into one scheme? (13)	BTL4	Analyzing
13	Explain about given memory management techniques. (i) Partitioned allocation. (7) (ii) Paging and translation look-aside buffer. (6)	BTL5	Evaluating
14	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. Identify the number of page faults would occur for the following replacement algorithms, assuming one, two, three, four, five, six, or seven frames? Remember all frames are initially empty, so your first unique pages will all cost one fault each. i). LRU replacement (4) ii). FIFO replacement (5) iii).Optimal replacement (4)	BTL6	Creating
15	A system uses 3 page frames for storing process pages in main memory. It uses the Least Recently Used (LRU) page replacement policy. Assume that all the page frames are initially empty. What is the total number of page faults that will occur while processing the page reference string given below- 4 , 7, 6, 1, 7, 6, 1, 2, 7, 2 Also calculate the hit ratio and miss ratio. (13)	BTL5	Evaluating

16	Write the key difference between the Contiguous and Non-Contiguous Memory Allocation. (13)	BTL3	Applying
17	i. Calculate the number of bits required in the address for memory having size of 16 GB. Assume the memory is 4-byte addressable. (7) ii. Calculate the size of memory if its address consists of 22 bits and the memory is 2-byte addressable. (6)	BTL5	Evaluating
PART – C			
1	(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)	BTL6	Creating
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)	BTL6	Creating
3	Explain paging scheme of memory management. What hardware support is needed for its implementation? (15)	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
5	Consider a machine with 64 MB physical memory and a 32 bit virtual address space. If the page size is 4 KB, what is the approximate size of the page table? (15)	BTL5	Evaluating
UNIT- IV : FILE SYSTEMS			
File-System Interface: File concept – Access methods – Directory structure – File system mounting – Protection. File-System Implementation: Directory implementation – Allocation methods – Free-space management – efficiency and performance – recovery – log-structured file systems.			
PART – A			
Q.No.	**Questions**	**BT Level**	**Competence**
1	List out the major attributes and operations of a file system.	BTL1	Remembering
2	What is the advantage of bit vector approach in free space management?	BTL1	Remembering
3	What is boot control block?	BTL1	Remembering
4	Write Short notes on file system mounting.	BTL1	Remembering
5	List out the drawbacks in indexed allocation	BTL1	Remembering
6	Define UFD and MFD.	BTL1	Remembering
7	Give the disadvantages of Contiguous allocation.	BTL2	Understanding
8	Outline the difference between file and directory.	BTL2	Understanding
9	What is consistency checking?	BTL2	Understanding
10	Outline the contiguous allocation with linked allocation method.	BTL2	Understanding
11	How the information in the file can be accessed?	BTL3	Applying
12	What is relative block number?	BTL3	Applying
13	Enlist different types of directory structure.	BTL3	Applying

14	Do FAT file system advantageous? Justify your answer?	BTL4	Analyzing
15	Mention the common file types	BTL4	Analyzing
16	Analyze the backup and restore of a file system.	BTL4	Analyzing
17	Evaluate the various file access methods.	BTL5	Evaluating
18	How does DMA increase system concurrency?	BTL5	Evaluating
19	Identify the advantages of bit vector free space management	BTL6	Creating
20	Identify the two important function of virtual File System (VFS) layer in the concept of file system implementation.	BTL6	Creating
21	What is the structure of the Directory in Operating System.	BTL1	Remembering
22	Analyze the advantage of Directory in Operating System.	BTL4	Analyzing
23	What is the bit map and bit vector	BTL1	Remembering
24	What are the two types of file sharing?	BTL1	Remembering
	PART – B		
1	(i)Describe with a neat sketch about the various directory structure. (7) (ii)Describe in detail about free space management with neat examples. (6)	BTL1	Remembering
2	(i)Brief 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)	BTL1	Remembering
3	i) Discuss about the various file access methods. (7) ii) With neat sketch explain about the: (6) a) Directory structure b) File sharing	BTL1	Remembering
4	Describe in detail about file sharing and protection. (13)	BTL1	Remembering
5	Outline in detail about the protection of file system. (13)	BTL2	Understanding
6	Discuss in detail about file attributes and file operation. (13)	BTL2	Understanding
7	(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)	BTL2	Understanding
8	Illustrate an application that could benefit from operating system support for random access to indexed files. (13)	BTL3	Applying
9	(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)	BTL3	Applying
10	Explain in detail about tree structured and acyclic graph directories. (13)	BTL3	Applying
11	(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) Explain in brief about different allocation methods with neat sketch. (8)	BTL4	Analyzing
12	Analyze the various file system mounting methods in detail. (13)	BTL4	Analyzing
13	Examine in detail about Directory and disk structure. (13)	BTL5	Evaluating
14	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)	BTL6	Creating
15	Discuss the file sharing system in the operating system and their types with proper example. (13)	BTL2	Understanding

16	Analyze working principles of the directory structure in operating system and justify your answer whether it is use full for the operating system or not. (13)	BTL4	Analyzing
17	Describe the details of free space management and memory allocation. (13)	BTL3	Applying
	PART – C		
1	Consider an example of an application in which data in a file should be accessed in the following order (i) Sequential (8) (ii) Random (7)	BTL-6	Creating
2	Evaluate how performance optimizations for file systems might result in difficulties in maintaining the consistency of the systems in the event of computer crashes. (15)	BTL-5	Evaluating
3	(i) Analyze in detail about the functions of files and file implementation. (8) (ii)Explain free space management with neat example. (7)	BTL-4	Analyzing
4	Evaluate some advantages and disadvantages of using SSDs as a caching tier and as a disk-drive replacement compared with using only magnetic disks. (15)	BTL-5	Evaluating
5	Give the brief explanation about the possible ways to access a file into a computer system with proper examples. (15)	BTL-4	Analyzing
	UNIT - V: I/O SYSTEMS		
I/O Systems – I/O Hardware – Application I/O interface – kernel I/O subsystem - streams – performance. Mass-Storage Structure: Disk scheduling – Disk management – Swap space management – disk attachment. Case study: I/O in Linux			
	PART – A		
Q.No.	**Questions**	**BT Level**	**Competence**
1	List out the disk scheduling algorithms?	BTL1	Remembering
2	Define Streams?	BTL1	Remembering
3	What are the advantages of caching?	BTL1	Remembering
4	Define rotational latency	BTL1	Remembering
5	Describe the typical pc bus structure	BTL1	Remembering
6	What is meant by interrupt driven I/O Cycle?	BTL1	Remembering
7	Give the advantages of polling.	BTL2	Understanding
8	Mention the various bus structures.	BTL2	Understanding
9	Summarize the advantages of swap space management?	BTL2	Understanding
10	Outline the system calls in Streams	BTL2	Understanding
11	Compare the synchronous and asynchronous streams	BTL3	Applying
12	Lists the advantages of blocking and non-blocking I/O	BTL3	Applying
13	Illustrate the various RAID levels	BTL3	Applying
14	Why rotational latency is usually not considered in disk scheduling?	BTL4	Analyzing
15	Analyze why it is important to scale up system bus and device speeds as CPU speed increases?	BTL4	Analyzing
16	Explain device reservation?	BTL4	Analyzing
17	How SSTF is more optimal than other disk scheduling algorithms?	BTL5	Evaluating
18	Why Disk Scheduling necessary	BTL5	Evaluating
19	State the typical bad-sector transactions	BTL6	Creating
20	Tell the function of Conflict Resolution mechanism?	BTL6	Creating
21	Define disk formatting.	BTL1	Remembering

22	Explain bad block.	BTL4	Analyzing
23	Give outline about SCSI	BTL2	Understanding
24	Illustrate the NAS	BTL3	Applying
	PART – B		
1	(i) What are the advantages of polling? (3) (ii) Explain in detail about application I/O Interface. (10)	BTL1	Remembering
2	Discuss in detail about the streams with a neat sketch. (13)	BTL1	Remembering
3	Discuss in detail about the various disk attachment methods. (13)	BTL1	Remembering
4	Demonstrate in detail about kernel I/O Subsystems. (13)	BTL1	Remembering
5	Describe in detail about interrupts. (13)	BTL2	Understanding
6	Summarize in detail about swap space management. (13)	BTL2	Understanding
7	Summarize briefly about the RAID structure in disk management with various RAID levels of organization in detail. (13)	BTL2	Understanding
8	Illustrate the I/O hardware with a typical PC bus structure. (13)	BTL3	Applying
9	Explain in detail about DMA Structure. (13)	BTL3	Applying
10	Illustrate in detail about Disk management. (13)	BTL3	Applying
11	State and explain the FCFS, SSTF and SCAN disk scheduling with examples. (13)	BTL4	Analyzing
12	Explain in detail about mass storage structures. (13)	BTL4	Analyzing
13	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)	BTL5	Evaluating
14	(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	BTL6	Creating
15	Write the short note on i. Remote procedure calls (7) ii. Small computer system interface (6)	BTL3	Applying
16	Discuss the details of possible ways available to pass information to Input output devices. (13)	BTL1	Remembering
17	Summaries the various application offered in input and output interface	BTL2	Understanding
	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 (i)FCFS (3) (ii) SSTF (3) (iii)SCAN (3) (iv)C-SCAN (3) (v)LOOK (3)	BTL6	Creating

2	How does a DMA increases system concurrency? How does it complicate the hardware design? (15)	BTL5	Evaluating
3	Distinguish between a STREAMS driver and a STREAMS module. (15)	BTL5	Evaluating
4	Why rotational latency usually not considered in disk scheduling. How would you modify SSTF, SCAN and C-SCAN to include latency optimization? (15)	BTL6	Creating
5	How the process can be swapped temporarily out of main memory to secondary storage. Explain with appropriate example	BTL5	Evaluating