SRM VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

QUESTION BANK

III SEMESTER

1904304-Operating Systems

Regulation – 2019

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SUBJECT : Operating Systems

SEM / YEAR: III Sem/ II Year

UNIT I -PROCESSES			
Introduction to operating systems - Evolution of Operating System - Operating System-structures – System calls – System programs –Processes: Process concept – Process scheduling – Operations on processes –Inter process communication – Communication in client-server systems.			
PART - A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	Give the objectives of an operating system.	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.	Analyze the layers in operating systems.	BTL-4	Analyzing
6.	List out some system calls required to control the communication system.	BTL-4	Analyzing
7.	What are the services of an operating system?	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 serial processing and batch processing.	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.	Give the functions 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
21.	Give the types of system calls in operating system.	BTL-2	Understanding
22.	Illustrate the main purpose of an operating system	BTL-3	Applying

23.	Analyze the different types of operating system	BTL-4	Analyzing
24.	Evaluate Why the operating system is important.	BTL-5	Evaluating
	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.	Discuss the pros and cons of serial processing and simple batch system. (13)	BTL-2	Understanding
6.	(i) State the operating system structure (4) (ii)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? (9)	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.	Discuss about micro kernel architecture. (13)	BTL-2	Understanding
9.	Explain the module architecture of an operating system with neat diagram. (13)	BTL-1	Remembering
10.	Discuss hybrid system design of an Operating system. (13)	BTL-4	Analyzing
11.	Distinguish between the dual mode and multi-mode operation in operating systems. (13)	BTL-1	Remembering
12.	Discuss the essential properties of the following types of systems. (i) Time sharing systems. (7) (ii) Multi-programmed batch systems. (6)	BTL-1	Remembering
13.	Explain inter–process communication. (13)	BTL-4	Analyzing
14.	How could a system be designed to allow a choice of operating systems from which to boot? (6) What would the bootstrap program need to do? (7)	BTL-4	Analyzing
15.	Give the advantages of peer-to-peer systems over client-server systems?	BTL-2	Understanding
16.	(i)Illustrate the objectives of operating system. (8) (ii)What are privileged instructions? (5)	BTL-3	Applying
17.	Explain the three main purposes of an operating system in detail. (13)	BTL-5	Evaluating
	PART – C		

1.	(i) With neat sketch discuss operating 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.(5) (ii)Explain system calls, system programs and OS generation.(10)	BTL-5	Evaluating
3.	Evaluate in detail the operating system services.(15)	BTL-5	Evaluating
4.	Summarize about four resources that will be allocated by operating system to users and processes.(15)	BTL-5	Evaluating
5.	Develop System Call – OS Relationship.(15)	BTL-6	Creating

UNIT II -PROCESS SCHEDULING AND SYNCHRONIZATION

CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling. Process Synchronization: The critical-section problem –Synchronization hardware – 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 process.	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.	List the CPU scheduling algorithms.	BTL-1	Remembering
6.	Differentiate short term and long term scheduler.	BTL-4	Analyzing
7.	Analyse the critical section problem.	BTL-3	Applying
8.	Show the use of monitors in process synchronization.	BTL-4	Analyzing
9.	Give the use of resource-allocation graph.	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.	Illustrate operation of semaphore with example procedure.	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-1	Remembering
16.	Define deadlock.	BTL-1	Remembering
17.	Show what are the schemes used to handle deadlock.	BTL-3	Applying
18.	Give the four necessary conditions for deadlock to occur.	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><td>21.</td><td>Distinguish between CPU bounded, I/O bounded processes.</td><td>BTL-2</td><td>Understanding</td></tr>
<tr><td>22.</td><td>Show what are the various scheduling criteria .</td><td>BTL-3</td><td>Applying</td></tr>
<tr><td>23.</td><td>Point out the functions of Dispatcher Module.</td><td>BTL-4</td><td>Analyzing</td></tr>
<tr><td>24.</td><td>Is it possible to have deadlock with one process?justify.</td><td>BTL-5</td><td>Evaluating</td></tr>
<tr><td colspan="4">PART – B</td></tr>
<tr><td>1.</td><td>(i) Define scheduling .Explain SJF scheduling algorithms . (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>BTL-1</td><td>Remembering</td></tr>
<tr><td>3.</td><td>What is a process? Discuss components of process and various states of a process with the help of a process state transition diagram. (13)</td><td>BTL-2</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>BTL-1</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) Describe PCB. Explain process state transition diagram. (6)</td><td>BTL-1</td><td>Remembering</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>BTL-3</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 to solve Dining philosopher problem. (13)</td><td>BTL-5</td><td>Evaluating</td></tr>
<tr><td>9.</td><td>Design how to implement wait() and signal() semaphore operations .(13)</td><td>BTL-6</td><td>Creating</td></tr>
</table>

<table>
<tr><td>10.</td><td>Explain Deadlock detection with suitable example. (13)</td><td>BTL-4</td><td>Analyzing</td></tr>
<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>BTL-2</td><td>Understanding</td></tr>
<tr><td>12.</td><td>(i) Illustrate deadlock with neat example.(7)
(ii) 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? (6)</td><td>BTL-1</td><td>Remembering</td></tr>
<tr><td>13.</td><td>Discuss in detail the critical section problem and write the algorithm for producer consumer problem.(13)</td><td>BTL-2</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>15</td><td>Describe what is deadlock. Write about deadlock condition and banker’s algorithm in detail (13)</td><td>BTL-2</td><td>Understanding</td></tr>
</table>

<table>
<tr><td>16</td><td>For below Processes table, calculate the average waiting time for the algorithms:
• First Come First Serve (FCFS) (4)
• Shortest Job First (SJF) and (4)
• Priority Scheduling (5)
Process Burst Time Priority
P1 10 3
P2 1 1
P3 2 4
P4 1 5
P5 5 2</td><td>BTL-3</td><td>Applying</td></tr>
<tr><td>17</td><td>Evaluate and explain the conditions for deadlock prevention. (13)</td><td>BTL-5</td><td>Evaluating</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>
<tr><td>2.</td><td>(i).Consider the following set of processes with the length of CPU burst time given in milliseconds.
<table><tr><th>Process</th><th>Burst Time</th><th>priority</th><th>Arrival Time</th></tr><tr><td>P1</td><td>10</td><td>3</td><td>0</td></tr><tr><td>P2</td><td>1</td><td>1</td><td>1</td></tr><tr><td>P3</td><td>2</td><td>3</td><td>2</td></tr><tr><td>P4</td><td>1</td><td>4</td><td>1</td></tr><tr><td>P5</td><td>5</td><td>2</td><td>2</td></tr></table>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)</td><td>BTL-5</td><td>Evaluating</td></tr>
<tr><td>3.</td><td>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.</td><td>BTL-5</td><td>Evaluating</td></tr>
</table>

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
5.	Consider the following set of processes with the length of the CPU-burst time in given ms: all 5 processess arrive at time 0 in the order given. Process | Burst Time P1 | 10 P2 | 29 P3 | 03 P4 | 07 P5 | 12 Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, priority and RR(quantum=10)scheduling. Also calculate average waiting time and turnaround time for each scheduling algorithms. (15)	BTL-6	Creating

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.			
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.	When is page replacement algorithm needed?	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 swapping process occur?	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.	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
21.	Give the steps required to handle a page fault in demand paging.	BTL-2	Understanding
22.	Show what do you meant by hit and miss in paging.	BTL-3	Applying
23.	Analyse the common strategies to select a free hole from a set of available holes?	BTL-4	Analyzing
24.	How the problem of internal fragmentation can be solved?	BTL-2	Understanding
	PART - B		
1.	(i)What is demand paging? (3) (ii) Describe the process of demand paging in OS. (10)	BTL-2	Understanding
2.	With a neat sketch, explain how logical address is translated into physical address using Paging mechanism. (13)	BTL-1	Remembering
3.	Explain main memory management in detail with necessary diagram. (13)	BTL-3	Applying
4.	Discuss about contiguous memory allocation with a neat diagram. (13)	BTL-5	Evaluating
5.	Discuss situation under which the FIFO page replacement algorithm generates fewer page faults than the LRU page replacement algorithm..(13)	BTL-2	Understanding
6.	(i)When do page faults occur? (3) (ii)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 three and four page frames? (10)	BTL-6	Creating
7.	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? (13)	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)What is the cause of Thrashing? (3) (ii)How does the system detect thrashing? Once it detects thrashing, what can the system do to eliminate this problem? (10)	BTL-1	Remembering
10.	Draw the diagram of segmentation memory management scheme and explain its principle. (13)	BTL-3	Applying
11.	(i) Analyse how paging supports virtual memory. (4) (ii) With neat diagram explain how logical memory addresses are translated into physical memory address. (9)	BTL-4	Analyzing
12.	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. (13)	BTL-4	Analyzing
13.	Discuss the given memory management techniques with diagrams. (i)Paging and (7) (ii) 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 up to 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-invalid 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
15.	Discuss the steps needed to handle page fault with neat illustration.(13)	BTL-2	Understanding
16.	Illustrate what are the various Page Replacement Algorithms used in memory management. (13)	BTL-3	Applying
17.	Evaluate when page faults will occur? Describe the actions taken by operating system during page fault. (13)	BTL-5	Evaluating
	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) i) LRU replacement ii) FIFO replacement iii) Optimal replacement.	BTL-5	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)	BTL-5	Evaluating
4.	Differentiate between internal and external fragmentation? Suppose that we have memory of 1000 KB with partitions of size 150 KB , 200 KB, 250 KB, 100 KB AND 300 KB. Where the processes A and B of size 175 KB and 125 KB will be loaded, if we used Best fit and Worst fit? (15)	BTL-6	Creating
5.	Most systems allow programs to allocate more memory to its address space during execution. Data allocated in the heap segments of programs is an example of such allocated memory. What is required to support dynamic memory allocation in the following schemes? (15)	BTL-5	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.	Compare the various file access methods.	BTL-5	Evaluating
2.	What is rotational latency?	BTL-4	Analyzing
3.	Enlist different types of directory structure.	BTL-3	Applying
4.	Mention the common file types	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.	How the information in the file can be accessed?	BTL-3	Applying
9.	List out the drawbacks in indexed allocation	BTL-1	Remembering
10.	Define UFD and MFD.	BTL-1	Remembering
11.	Give the disadvantages of Contiguous allocation.	BTL-2	Understanding
12.	Analyze the advantages of bit vector free space management	BTL-6	Creating
13.	Differentiate between file and directory.	BTL-1	Remembering
14.	What is consistency checking?	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.	What is boot control block?	BTL-1	Remembering
18.	Analyze the backup and restore of a file system.	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.	Compare contiguous allocation with linked allocation method.	BTL-2	Understanding
21.	Analyse the various file accessing methods.	BTL-2	Understanding
22.	Show what are the allocation methods of a disk space.	BTL-3	Applying
23.	Examine how an index file is used to speed up the access in direct-access files.	BTL-4	Analyzing
24.	Determine the most common schemes for defining the logical structure of a directory.	BTL-5	Evaluating
	PART – B		
1.	Describe in detail about file sharing and protection.(13)	BTL-1	Remembering
2.	Analyze the various file system mounting methods in detail. (13)	BTL-6	Creating
3.	Explain in detail about tree structured and acyclic graph directories. (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.	Discuss about the various file access methods. (13)	BTL-2	Understanding
6.	Explain in detail about file attributes and file operation. (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.	Analyze the File system implementation. (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.	Explain how to recover in a file system. (13)	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) Explain in brief about different allocation methods with neat sketch. (8)	BTL-1	Remembering

15.	(i)Explain how free-space is managed using bit vector implementation. (10) (ii)List its advantages. (3)	BTL-2	Understanding
16.	Consider a file system where a file can be deleted and the disk space reclaimed while the 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 these problem be avoided? (13)	BTL-3	Applying
17.	Evaluate Linked Allocation method. (5) What are the advantages and disadvantages of Linked Allocation? (8)	BTL-5	Evaluating
	PART – C		
1.	Give 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.	Discuss 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)Discuss the functions of files and file implementation. (8) (ii)Explain free space management with neat example. (7)	BTL-6	Creating
4.	Consider a system that supports 5000 users. Suppose that you want to allow 4990 of these users to be able to access one file a) How would you specify this protection scheme in file system (7) b) Could you suggest another protection scheme that can be used more effectively for this purpose than the scheme provided by the file system? (8)	BTL-5	Evaluating
5.	Determine the most common schemes for defining the logical structure of a directory? (15)	BTL-5	Evaluating

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.			
PART – A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	Give the advantages of polling.	BTL-2	Understanding
2.	Mention the various bus structures.	BTL-2	Understanding
3.	Illustrate the typical pc bus structure.	BTL-1	Remembering
4.	What is meant by interrupt driven I/O Cycle?	BTL-1	Remembering
5.	Why is it important to scale up system bus and device speeds as CPU	BTL-4	Analyzing
6.	Define rotational latency	BTL-1	Remembering
7.	What are the advantages of DMA?	BTL-2	Understanding
8.	Compare the synchronous and asynchronous streams.	BTL-4	Analyzing
9.	What are the advantages of magnetic disk?	BTL-1	Remembering
10.	State the typical bad-sector transactions	BTL-6	Creating
11.	Why rotational latency is usually not considered in disk scheduling?	BTL-2	Understanding
12.	List out the disk scheduling algorithms?	BTL-1	Remembering

13.	How SSTF is more optimal than other disk scheduling algorithms?	BTL-6	Creating
14.	Mention the various levels of disk management.	BTL-3	Applying
15.	List the advantages of blocking and non blocking I/O.	BTL-3	Applying
16.	Explain device reservation?	BTL-4	Analyzing
17.	Mention about the interrupt handling techniques.	BTL-5	Evaluating
18.	What is Streams?	BTL-1	Remembering
19.	List the system calls in Streams.	BTL-3	Applying
20.	Summarize the advantages of swap space management?	BTL-5	Evaluating
21.	Which disk scheduling algorithm would be best to optimize the performance of a RAM disk?	BTL-2	Understanding
22.	Illustrate the reasons for buffering in kernel I/O subsystem.	BTL-3	Applying
23.	Analyse the characteristics that determine the disk access speed.	BTL-4	Analyzing
24.	Name the different I/O registers.	BTL-5	Evaluating
	PART – B		
1.	Explain about disk management with various levels of organization in detail . (13)	BTL-5	Evaluating
2.	(i)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. (10) (ii)Explain the pros and cons of all disks scheduling algorithms. (3)	BTL-2	Understanding
3.	Illustrate the I/O hardware with a typical pc bus structure. (13)	BTL-3	Applying
4.	(i)Define interrupt .Give its importance. (5) (ii) Describe in detail about interrupts. (8)	BTL-2	Understanding
5.	(i) What are the advantages of polling. (3) (ii)Explain in detail about application I/O Interface. (10)	BTL-1	Remembering
6.	(i) List the importance of DMA (3) (ii) Explain in detail about DMA Structure. (10)	BTL-1	Remembering
7.	Demonstrate in detail about kernel I/O Subsystems . (13)	BTL-3	Applying
8.	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. (4+4+5) a)SSTF b) LOOK c) CSCAN	BTL-6	Creating
9.	State and explain the FCFS, SSTF and SCAN disk scheduling with examples. (13)	BTL-4	Analyzing
10.	Discuss in detail about the streams with a neat sketch.(13) (13)	BTL-1	Remembering
11.	Summarize in detail about swap space management. (13)	BTL-2	Understandin

12.	Explain in detail about Disk management. (13)	BTL-4	Analyzing
13.	Discuss in detail about the various disk attachment methods. (13)	BTL-4	Analyzing
14.	Explain in detail about mass storage structures. (13)	BTL-1	Remembering
15.	Compare the functionalities of FCFS, SSTF, C-SCAN and CLOOK with example. (4+3+3+3)	BTL-2	Understanding
16.	The requested tracks, in the order received are: 98,183,37,122,14,124,65,67. Apply the following disk scheduling algorithms. Starting track at 53. i) FCFS ii) SSTF iii) C-SCAN iv) C-SCAN. (4+3+3+3)	BTL-3	Applying
17.	Summarize the life cycle of an I/O request with a neat sketch. (13)	BTL-5	Evaluating
	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) FCFS (ii) SSTF (iii) SCAN (iv) C-SCAN (v) LOOK	BTL-6	Creating
2.	How does a DMA increases system concurrency? How does it complicate the hardware design? (15)	BTL-5	Evaluating
3.	Distinguish between a STREAMS driver and a STREAMS module. (15)	BTL-5	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)	BTL-6	Creating
5.	Describe the circumstances under which blocking I/O and non-blocking I/O should be used. Why not just implement non-blocking I/O and have processes busy-wait until their device is ready? (15)	BTL-5	Evaluating