SRM VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

QUESTION BANK

IV SEMESTER

IT3461-OPERATING SYSTEMS

Regulation – 2023

Academic Year 2024 – 25 (Even Semester)

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SUBJECT CODE & NAME : IT3461 - Operating Systems

SEM / YEAR: IV Sem/ II Year

UNIT I -PROCESSES			
Introduction to Operating System: Operating System Operations- Operating System Structures: Operating System-Services - User Operating System Interface - System Calls – System programs – Operating System Structure (monolithic, layered, modular, micro-kernel models).			
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 system boot in operating system?	BTL-1	Remembering
5.	List out the layers in operating systems.	BTL-1	Remembering
6.	What do you mean by system calls?	BTL-1	Remembering
7.	What are the services of an operating system?	BTL-1	Remembering
8.	Define Dual-Mode Operation	BTL-3	Applying
9.	What is meant by system call?	BTL-1	Remembering
10.	Give the disadvantages of multiprocessor system?	BTL-2	Understanding
11.	What is the purpose of system programs?	BTL-1	Remembering
12.	Show how does an interrupt differ from a trap?.	BTL-3	Applying
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.	Compare and contrast DMA and cache memory?	BTL-5	Evaluating
17.	Define: Clustered systems.	BTL-5	Evaluating
18.	Discuss the difference between symmetric and asymmetric multiprocessing.	BTL-4	Analyzing
19.	Illustrate What is the main advantage of multiprogramming?.	BTL-3	Applying
20.	What are the advantages of Peer –to- peer system over client - server systems?	BTL-1	Remembering
21.	Give the types of system calls in operating system.	BTL-2	Understanding
22.	Illustrate the steps in executing the system call.	BTL-3	Applying
23.	What is the need of bootstrap program?	BTL-4	Analyzing
PART - B			
1.	Demonstrate the various types of computer system based on the types of	BTL-5	Evaluating

	processor . (16)		
2.	Illustrate how the operating system has been evolved from serial processing to multiprogramming system. (16)	BTL-3	Applying
3.	Explain the various structure of an operating system. (8) Identify system calls and system programs in detail with neat sketch. (8)	BTL-1	Remembering
4.	Explain the evolution of operating system. (16)	BTL-2	Understanding
5.	Explain the basic computer system architecture.Illustrate with a neat diagram (16)	BTL-2	Understanding
6.	Explain the operating system structure (6) 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? (10)	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. (16)	BTL-3	Applying
8.	Discuss about common concepts of interrupt. (16)	BTL-2	Understanding
9.	Explain Multiprocessor system and its types. (16)	BTL-1	Remembering
10.	Discuss hybrid system design of an Operating system. (16)	BTL-4	Analyzing
11.	Distinguish between the dual mode and multi-mode operation in operatingsystems. (16)	BTL-1	Remembering
12.	Discuss the essential properties of the following types of systems. Time sharing systems. (8) Multi-programmed batch systems. (8)	BTL-1	Remembering
13.	Explain with a neat diagram clustered computer system and also its types. (16)	BTL-4	Analyzing
14.	Evaluate in detail the operating system services (16)	BTL-4	Analyzing
15.	Enumerate the different operating system structure and explain with neat sketch.(16)	BTL-2	Understanding
16.	Illustrate the objectives of operating system. (16)	BTL-3	Applying
17.	Explain the three main purposes of an operating system in detail. (16)	BTL-5	Evaluating
18.	With neat sketch discuss operating system overview. (16)	BTL-6	Creating
19.	State the basic functions of OS. (6) Explain system calls, system programs and OS generation. (10)	BTL-5	Evaluating
20.	Evaluate in detail the operating system services. (16)	BTL-5	Evaluating
21.	Summarize about four resources that will be allocated by operating system to users and processes. (16)	BTL-5	Evaluating
22.	Develop System Call – OS Relationship. (16)	BTL-6	Creating
UNIT II -PROCESS SCHEDULING AND SYNCHRONIZATION			
Processes - Process Concept - Process Scheduling - Operations on Processes - Inter-process Communication; CPU Scheduling - Scheduling criteria - Scheduling algorithms: Process Synchronization - The Critical-Section problem –Semaphores, Deadlock - Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock			
PART – A			
1.	Name and draw five different process states with proper definition.	BTL-1	Remembering

<table>
<tr><td>2.</td><td>Define the term process.</td><td>BTL-1</td><td>Remembering</td></tr>
<tr><td>3.</td><td>Is the context switching an overhead? Justify your answer.</td><td>BTL-4</td><td>Analyzing</td></tr>
<tr><td>4.</td><td>Distinguish between CPU bounded and I/O bounded processes.</td><td>BTL-2</td><td>Understanding</td></tr>
<tr><td>5.</td><td>List the CPU scheduling algorithms.</td><td>BTL-1</td><td>Remembering</td></tr>
<tr><td>6.</td><td>Differentiate short term and long-term scheduler.</td><td>BTL-4</td><td>Analyzing</td></tr>
<tr><td>7.</td><td>Analyse the critical section problem.</td><td>BTL-3</td><td>Applying</td></tr>
<tr><td>8.</td><td>Show the use of monitors in process synchronization.</td><td>BTL-4</td><td>Analyzing</td></tr>
<tr><td>9.</td><td>Give the use of resource-allocation graph.</td><td>BTL-2</td><td>Understanding</td></tr>
<tr><td>10.</td><td>List out the data fields associated with Process Control Blocks.</td><td>BTL-6</td><td>Creating</td></tr>
<tr><td>11.</td><td>“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.</td><td>BTL-5</td><td>Evaluating</td></tr>
<tr><td>12.</td><td>What is meant by 'starvation' in operating system?</td><td>BTL-2</td><td>Understanding</td></tr>
<tr><td>13.</td><td>Illustrate operation of semaphore with example procedure.</td><td>BTL-3</td><td>Applying</td></tr>
<tr><td>14.</td><td>Give the queueing diagram representation of process scheduling</td><td>BTL-2</td><td>Understanding</td></tr>
<tr><td>15.</td><td>What is the meaning of busy waiting?</td><td>BTL-1</td><td>Remembering</td></tr>
<tr><td>16.</td><td>Define deadlock.</td><td>BTL-1</td><td>Remembering</td></tr>
<tr><td>17.</td><td>Show what are the schemes used to handle deadlock.</td><td>BTL-3</td><td>Applying</td></tr>
<tr><td>18.</td><td>Give the four necessary conditions for deadlock to occur.</td><td>BTL-5</td><td>Evaluating</td></tr>
<tr><td>19.</td><td>“If there is a cycle in the resource allocation graph, it may or may not be in deadlock state“. Comment on this statement.</td><td>BTL-6</td><td>Creating</td></tr>
<tr><td>20.</td><td>List out the methods used to recover from the deadlock.</td><td>BTL-1</td><td>Remembering</td></tr>
<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 algorithm. (8)
(ii)Compute the average waiting time for the processes using non-preemptive SJF scheduling algorithm.(8)
<table>
<tr><td>Process</td><td>Arrival time</td><td>Burst time</td></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. (16)</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. (16)</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. (5)
ii. Average turnaround time and maximum waiting time. (5)
iii. I/O device utilization and CPU utilization. (6)</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</td><td>BTL-1</td><td>Remembering</td></tr>
</table>

<table>
<tr><td></td><td>processes. (8)
(ii) Describe PCB. Explain process state transition diagram. (8)</td><td></td><td></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>(i).Explain round robin schedulingalgorithms with an example (8)
(ii).Describe Multilevel feedback queues. (8)</td><td>BTL-4</td><td>Analyzing</td></tr>
<tr><td>8.</td><td>Outline a solution to solve Dining philosopher problem. (16)</td><td>BTL-5</td><td>Evaluating</td></tr>
<tr><td>9.</td><td>Design how to implement wait() and signal() semaphore operations with examples.(16)</td><td>BTL-6</td><td>Creating</td></tr>
<tr><td>10.</td><td>Explain Deadlock detection with suitable example. (16)</td><td>BTL-4</td><td>Analyzing</td></tr>
<tr><td>11.</td><td>Consider the snapshot of a system(16)
<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-5</td><td>Evaluating</td></tr>
<tr><td>12.</td><td>(i) Illustrate deadlock with neat example.(6)
(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? (10)</td><td>BTL-3</td><td>Applying</td></tr>
<tr><td>13.</td><td>Discuss in detail the critical section problem and write the algorithm for producer consumer problem. (16)</td><td>BTL-2</td><td>Understanding</td></tr>
<tr><td>14.</td><td>Which of the following scheduling algorithms could result in starvation?
(i)First-come, first-served (5)
(ii) Shortest job first (5)</td><td>BTL-6</td><td>Creating</td></tr>
</table>

<table>
<tr><td></td><td>(iii) Round robin (5)
Detail with Justification.</td><td></td><td></td></tr>
<tr><td>15.</td><td>Describe what is deadlock. Write about deadlock condition and banker's algorithm in detail (16)</td><td>BTL-2</td><td>Understanding</td></tr>
<tr><td>16.</td><td>For below Processes table, calculate the average waiting time for the algorithms:
(i) First Come First Serve (FCFS) (5)
(ii) Shortest Job First (SJF) and (5)
(iii) Priority Scheduling (6)
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.(16)</td><td>BTL-5</td><td>Evaluating</td></tr>
<tr><td>18.</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. (6)</td><td>BTL-5</td><td>Evaluating</td></tr>
<tr><td>19.</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: The maximum need of each process is between 1 and m resources. The sum of all maximum needs is less than m+n. (16)</td><td>BTL-4</td><td>Analyzing</td></tr>
<tr><td>20.</td><td>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:
<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><th>Need
A B C D</th></tr>
<tr><td>P0</td><td>6 0 1 2</td><td>4 0 0 1</td><td>3 2 1 1</td><td></td></tr>
<tr><td>P1</td><td>1 7 5 0</td><td>1 1 0 0</td><td></td><td></td></tr>
<tr><td>P2</td><td>2 3 5 6</td><td>1 2 5 4</td><td></td><td></td></tr>
<tr><td>P3</td><td>1 6 5 3</td><td>0 6 3 3</td><td></td><td></td></tr>
<tr><td>P4</td><td>1 6 5 6</td><td>0 2 1 2</td><td></td><td></td></tr>
</table>
Using Banker's algorithm, answer the following questions:
(i) How many resources of type A,B,C and D are there? (4)
(ii) What are the contents of the need matrix? (4)
(iii) Is the system in a safe state? Why? (4)</td><td>BTL-5</td><td>Evaluating</td></tr>
</table>

	(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. (4)		
21.	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 - MEMORY MANAGEMENT			
Main Memory: Swapping- Contiguous Memory Allocation – Paging - Structure of the Page Table - Segmentation, Virtual Memory - Demand Paging – Copy on Write – Page Replacement - Allocation of Frames –Thrashing.			
PART - A			
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 sizeis 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? 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 contiguous memory allocation.	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 pagereplacement algorithm? Assuming there is four frames.	BTL-1	Remembering
16.	What is meant by pre-paging? Is it better than demand paging?	BTL-1	Remembering
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
25.	What is Copy-on-Write (COW) in operating systems, and how does it optimize memory usage during process creation?	BTL-1	Remembering
	PART - B		
1.	Describe the process of demand paging in OS with nest diagram . (16)	BTL-2	Understanding
2.	With a neat sketch, explain how logical address is translated into physical address using Paging mechanism. (16)	BTL-1	Remembering
3.	Explain main memory management in detail with necessary diagram(16)	BTL-3	Applying
4.	Discuss about contiguous memory allocation with a neat diagram. (16)	BTL-5	Evaluating
5.	Discuss situation under which the FIFO page replacement algorithm generates fewer page faults than the LRU page replacement algorithm..(16)	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? (13)	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, and95 KB (in order)? Which the algorithms make the most efficient use of memory? (16)	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. (16)	BTL-1	Remembering
9.	What is the cause of Thrashing? (3) How does the system detect thrashing? Once it detects thrashing, what can the system do to eliminate this problem? (13)	BTL-1	Remembering
10.	Draw the diagram of segmentation memory management scheme and explain its principle. (16)	BTL-3	Applying
11.	Analyse how paging supports virtual memory. (7) 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	BTL-4	Analyzing

	wouldoccur 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. (16)		
13.	(i)Discuss the given memory management techniques with diagrams. (i) Paging (8) (ii) Translation Look-aside Buffer.(8)	BTL-2	Understanding
14.	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. i) Find the physical address of 13,256 and another logical address with pagenumber 2 and offset of 128. Discuss about the possible valid-invalid bit and possible protection bits inpage table. (5) ii) Consider a paging system with page table stored in memory If a memory reference takes 50ns how long does a paged memory referenced take? (5) iii) If we add TLB and 75% of all page table reference are foundin TLB, what is the effective memory referencetime?(Assume that find a page entry in TLB takes 2ns,if entry is present) (6)	BTL-1	Remembering
15.	Discuss the steps needed to handle page fault with neat illustration (16)	BTL-2	Understanding
16.	Illustrate what are the various Page Replacement Algorithms used in memory management. (16)	BTL-3	Applying
17.	Evaluate when page faults will occur? Describe the actions taken by operating system during page fault. (16)	BTL-5	Evaluating
18.	Explain the concept of **Copy-On-Write (COW)** in operating systems. Discuss its implementation, advantages, and limitations, with relevant examples. (16)	BTL-4	Analyzing
19.	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 followingreplacement algorithms, assuming four frames? Remembering all frames are initially empty. (16) LRU replacement FIFO replacement Optimal replacement.	BTL-6	Creating
20.	Explain in detail about paging in 32-bit and 64-bit architectures (6) 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-5	Evaluating
21.	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	BTL-6	Creating

	frames are empty. (12) Explain the effect of thrashing. (4)		
22.	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? (16)	BTL-5	Evaluating
23.	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? (16)	BTL-5	Evaluating
UNIT IV - STORAGE MANAGEMENT			
File-System Interface -File concept - Access methods - Directory Structure – Protection. - File System Implementation - File System Structure – File System Operations - Directory implementation - Allocation Methods - Free Space Management; Mass Storage system – Disk Structure - Disk Scheduling –Disk Management- Swap-Space Management.			
PART – A			
1.	Compare the various file access methods.	BTL-5	Evaluating
2.	What is rotational latency?	BTL-1	Remembering
3.	Enlist different types of directory structure.	BTL-2	Understanding
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-1	Remembering
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-4	Analyzing
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-accessfiles.	BTL-4	Analyzing
24.	Determine the most common schemes for defining the logical structure ofa directory.	BTL-5	Evaluating

25.	What defines a mass storage system, and how does it differ from primary memory?	BTL-1	Remembering
26.	What does disk scheduling mean in an operating system?	BTL-1	Remembering
27.	What is the role of disk management in an operating system, and why is it important?	BTL-2	Understanding
28.	What is swap-space management, and how does it assist in managing memory in an operating system?	BTL-2	Understanding
PART - B			
1.	Describe in detail about file sharing and protection.(16)	BTL-1	Remembering
2.	Analyze the various file system mounting methods in detail. (16)	BTL-4	Analyzing
3.	Explain in detail about tree structured and acyclic graph directories. (16)	BTL-5	Evaluating
4.	(i)Describe with a neat sketch about the various directory structure. (8) (ii)Describe in detail about free space management with neat examples. (8)	BTL-1	Remembering
5.	Discuss about the various file access methods. (16)	BTL-2	Understanding
6.	Explain in detail about file attributes and file operation. (16)	BTL-2	Understanding
7.	Illustrate an application that could benefit from operating system support for random access to indexed files. (16)	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? (16)	BTL-3	Applying
9.	Analyze the File system implementation.(16)	BTL-4	Analyzing
10.	Why is it important to balance file system I/O among the disks and controllers on a system in a multitasking environment? (8) (8) Discuss the advantages and disadvantages of supporting links to files that cross mount points. (8)	BTL-2	Understanding
11.	Explain in detail the various allocation methods with their pros and cons. (8) Brief the various procedures need to be followed in disk management. (8)	BTL-1	Remembering
12.	Explain how to recover in a file system. (16)	BTL-4	Analyzing
13.	Examine in detail about Directory and disk structure. (16)	BTL-3	Applying
14.	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. (8) Explain in brief about different allocation methods with neat sketch. (8)	BTL-4	Analyzing
15.	Discuss disk space allocation methods, file systems, fragmentation, and the role of FAT and in odes in managing disk storage.	BTL-2	Understanding
16.	Explain how free-space is managed using bit vector implementation. (13) List its advantages. (3)	BTL-3	Applying
17.	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 occurif a new file is created in the same storage area or with the same absolutepath name? How these problem be avoided? (16)	BTL-5	Evaluating

18.	Evaluate Linked Allocation method. (8) What are the advantages and disadvantages of Linked Allocation? (8)	BTL-3	Applying
19.	Discuss the strategies used for managing swap space. How does swap-space management work in an operating system to extend memory? (16)	BTL-5	Evaluating
20.	Give an example of an application in which data in a file should be accessed in the following order Sequential (8) Random (8)	BTL-2	Understanding
21.	Discuss how performance optimizations for file systems might result in difficulties in maintaining the consistency of the systems in the event of computer crashes. (16)	BTL-5	Evaluating
22.	Explain the concept and components of a mass storage system. How does it differ from primary memory in terms of usage and performance? (16)	BTL-2	Understanding
23.	Consider a system that supports 5000 users. Suppose that you want to allow 4990 of these users to be able to access one file. How would you specify this protection scheme in file system (8) 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
24.	Determine the most common schemes for defining the logical structure of a directory? (16)	BTL-5	Evaluating
	UNIT V - MOBILE OS AND CASE STUDIES		
Mobile OS - iOS and Android. The Linux System: Design Principles-Kernel Modules- Process Management-Scheduling-Memory Management-File Systems - Input and Output- Inter process communication.			
	PART – A		
1.	What is Linux distribution?	BTL-2	Understanding
2.	What is the use of User mode?	BTL-2	Understanding
3.	What are the components of kernel mode	BTL-1	Remembering
4.	Do FAT file system is advantageous? Why?	BTL-1	Remembering
5.	What is the responsibility of kernel in Linux operating system?	BTL-4	Analyzing
6.	Enumerate the requirements for Linux system administrator. Brief any one?	BTL-1	Remembering
7.	State the components of a Linux System?	BTL-2	Understanding
8.	Define the function of Caching-only servers?	BTL-4	Analyzing
9.	What scheduling algorithm is used in linux operating system to schedule jobs?	BTL-1	Remembering
10.	Mention any two features of Linux file systems.	BTL-6	Creating
11.	Enlist the advantages of using kernel modules in Linux.	BTL-2	Understanding
12.	List the advantages of Linux OS.	BTL-1	Remembering
13.	List the advantages and disadvantage of writing an operating system in high level language such as C.	BTL-6	Creating
14.	What is handle? How does a process obtain a handle?	BTL-3	Applying

15.	What are the Components of a Linux System?	BTL-3	Applying
16.	Which layer of iOS contains fundamental system services for apps?	BTL-4	Analyzing
17.	What are the features of Linux file system?	BTL-5	Evaluating
18.	Define the components of LINUX system	BTL-1	Remembering
19.	What scheduling algorithm is used in Linux to schedule jobs?	BTL-3	Applying
20.	Which layer of iOS contains fundamental system services for apps?	BTL-5	Evaluating
21.	Define Mobile os and ios	BTL-2	Understanding
22.	What is Android?	BTL-3	Applying
23.	Difference between Mobile OS and IOS OS	BTL-4	Analyzing
24.	Define File system.	BTL-5	Evaluating
PART - B			
1.	Explain in detail about the concepts of Linux system.	BTL-5	Evaluating
2.	Discuss in detail about setting up a Linux mainframe server	BTL-2	Understanding
3.	Illustrate in detail about Linux host and adding guest OS	BTL-3	Applying
4.	Briefly discuss about the requirements to become a Linux system administrator	BTL-2	Understanding
5.	Discuss about the steps involved in the installation of a Linux Multifunction server.	BTL-1	Remembering
6.	Write about LINUX architecture and LINUX kernel with neat sketch	BTL-1	Remembering
7.	(i)Explain the components of Linux system with neat sketch. (8) (ii)Write the various system administrator roles in LINUX OS.(8)	BTL-3	Applying
8.	(i) Explain in details about how process is managed and scheduled in linux? (8) (ii) Discuss about Inter Process Communication (IPC) in linux (8)	BTL-2	Understanding
9.	With frame work explain the working function of android operating system architecture. Compare the feature of IoS and android	BTL-5	Evaluating
10.	Discuss the process and memory management in Lin	BTL-1	Remembering
11.	Explain the architecture of iOS. Discuss the media and service layers clearly.	BTL-2	Understanding
12.	What are the primary goals of the conflict-resolution mechanism used by the Linux kernel for loading kernel modules?	BTL-4	Analyzing
13.	Explain what are the Scheduling concepts followed by Linux environment.	BTL-4	Analyzing
14.	Describe in detail the salient features of Linux I/O	BTL-1	Remembering
15.	Write briefly about mobile OS and IOS in detail	BTL-2	Understanding
16.	Illustrate and explain about the Android file management.	BTL-3	Applying
17.	Explain the architecture of Android OS	BTL-5	Evaluating