

SRM VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF INFORMATION TECHNOLOGY
(Common to Computer Science and Engineering, Artificial Intelligence &
DataScience and Cyber Security)

QUESTION BANK

s



IV SEMESTER

IT3461-OPERATING SYSTEMS

Regulation – 2023

Academic Year 2025 – 26 (Even Semester)

Prepared by

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DEPARTMENT OF INFORMATION TECHNOLOGYS

QUESTION BANK

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.	What is Dual-Mode Operation in an operating system?	BTL-1	Remembering
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.	State the difference between an interrupt and a trap.	BTL-2	Understanding
13.	Write the differences of batch systems and time sharing systems.	BTL-2	Understanding
14.	Differentiate between multiprogramming and time-sharing systems.	BTL-2	Understanding
15.	Give the functions of operating systems.	BTL-2	Understanding
16.	Write the basic difference between DMA and cache memory.	BTL-2	Understanding
17.	What is a clustered system in an operating system?	BTL-1	Remembering
18.	Differentiate between symmetric and asymmetric multiprocessing.	BTL-2	Understanding
19.	State the main advantage of multiprogramming.	BTL-1	Remembering
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.	State the purpose of an operating system.	BTL-1	Remembering
23.	List the steps involved in executing a system call.	BTL-2	Understanding
24.	State the need of bootstrap program?	BTL-1	Understanding

PART - B

1.	Compare and analyze the various types of computer systems based on the types of processors used. (16)	BTL-4	Analyzing
2.	Analyze the evolution of operating systems from serial processing to multiprogramming systems, highlighting the limitations and improvements at each stage. (16)	BTL-4	Analyzing
3.	Analyze different operating system structures and examine the role of system calls and system programs in supporting these structures with suitable illustrations. (16)ss	BTL-4	Analyzing
4.	Evaluate the evolution of operating systems by comparing early and modern OS features with respect to efficiency and resource utilization. (16)	BTL-5	Evaluating
5.	Analyze the basic computer system architecture and justify the role of each component in efficient operating system functioning with a neat diagram. (16)	BTL-4	Analyzing
6.	Analyze the operating system structure and operations and justify how the absence of hardware-supported dual mode leads to serious OS security and reliability issues. (16)	BTL-4	Analyzing
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.	Analyze various interrupt handling mechanisms and examine their impact on system performance and responsiveness. (16)	BTL-4	Analyzing
9.	Analyze multiprocessor systems and compare different types based on performance, scalability, and reliability. (16)	BTL-4	Analyzing
10.	Evaluate the hybrid operating system design by analyzing how it combines features of different OS architectures. (16)	BTL-5	Evaluating
11.	Analyze and compare dual-mode and multi-mode operations in operating systems with respect to protection and system control. (16)	BTL-4	Analyzing
12.	Discuss the essential properties of the following types of systems. (i) Time sharing systems. (8) (ii) Multi-programmed batch systems. (8)	BTL-3	Applying
13.	Analyze clustered computer systems and evaluate their advantages and limitations with respect to availability and performance. (16)	BTL-5	Evaluating
14.	Evaluate operating system services by examining their contribution to user convenience, system efficiency, and resource management. (16)	BTL-5	Evaluating
15.	Analyze different operating system structures and assess their suitability for various computing environments using neat sketches. (16)	BTL-4	Analyzing
16.	Analyze the objectives of an operating system and explain how each objective influences system design decisions. (16)	BTL-4	Analyzing
17.	Evaluate the three primary purposes of an operating system in terms of performance, security, and usability. (16)	BTL-5	Evaluating
18.	Construct a detailed operating system overview illustrating its components and interactions using a neat diagram. (16)	BTL-6	Creating
19.	Analyze the core functions of an operating system and examine the role of system calls and system programs across different OS generations. (16)	BTL-4	Analyzing

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.	Design and illustrate the relationship between system calls and operating system services using a layered architectural view. (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 the five different process states and define each.	BTL-2	Understanding
2.	Define the term process.	BTL-1	Remembering
3.	Is context switching an overhead? State your answer.	BTL-2	Understanding
4.	Distinguish between CPU-bound and I/O-bound processes.	BTL-2	Understanding
5.	List the CPU scheduling algorithms.	BTL-1	Remembering
6.	Differentiate short term and long-term scheduler.	BTL-2	Understanding
7.	What is the critical-section problem?	BTL-1	Remembering
8.	What is a monitor in process synchronization?	BTL-1	Remembering
9.	What is a resource-allocation graph?	BTL-1	Remembering
10.	List out the data fields associated with Process Control Blocks.	BTL-1	Remembering
11.	What is priority inversion in real-time systems?	BTL-1	Remembering
12.	What is meant by 'starvation' in operating system?	BTL-1	Remembering
13.	What is a semaphore in an operating system?	BTL-1	Remembering
14.	What is a queueing diagram in process scheduling?	BTL-1	Remembering
15.	What is the meaning of busy waiting?	BTL-1	Remembering
16.	Define deadlock.	BTL-1	Remembering
17.	List the schemes used to handle deadlock.	BTL-1	Remembering
18.	List the four necessary conditions for deadlock to occur.	BTL-1	Remembering
19.	What is the role of cycle in a resource-allocation graph?	BTL-2	Understanding
20.	List out the methods used to recover from the deadlock.	BTL-1	Remembering
21.	List the various CPU scheduling criteria.	BTL-1	Remembering
22.	Point out the functions of Dispatcher Module.	BTL-2	Understanding
23.	Is deadlock possible with a single process? State your answer.	BTL-2	Understanding

PART – B

1.	(i) Define scheduling .Explain SJF scheduling algorithm. (8) (ii) Compute the average waiting time for the processes using non-preemptive SJF scheduling algorithm.(8)	BTL-4	Analyzing									
	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Process</th> <th>Arrival time</th> <th>Burst time</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">7</td> </tr> <tr> <td>P2</td> <td style="text-align: center;">2</td> <td style="text-align: center;">4</td> </tr> </tbody> </table>			Process	Arrival time	Burst time	P1	0	7	P2	2	4
Process	Arrival time			Burst time								
P1	0			7								
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		<table border="1"> <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>	P3	4	1	P4	5	4	P5	3	4										
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P4	5	4																			
P5	3	4																			
2.	Analyze and compare short-term, medium-term and long-term schedulers with suitable examples, highlighting their roles in process management. (16)	BTL-4	Analyzing																		
3.	Analyze the process concept by examining its components and evaluating the significance of each process state using a state transition diagram. (16)	BTL-4	Analyzing																		
4.	Analyze how conflicts arise among scheduling criteria conflict in certain settings. <ul style="list-style-type: none"> 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) 	BTL-4	Analyzing																		
5.	(i).Discuss the actions taken by a kernel to context-switch between processes. (8) (ii) Describe PCB. Explain process state transition diagram. (8)	BTL-3	Applying																		
6.	Consider the following set of processes with the length of the CPU-burst time in given ms: <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Process</th> <th>Burst Time</th> <th>Arrival time</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>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)</p>	Process	Burst Time	Arrival time	P1	8	0	P2	4	1	P3	9	2	P4	5	3	P5	3	4	BTL-3	Applying
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P5	3	4																			
7.	(i).Explain round robin scheduling algorithms with an example (8) (ii).Describe Multilevel feedback queues. (8)	BTL-4	Analyzing																		
8.	Outline a solution to solve Dining philosopher problem. (16)	BTL-5	Evaluating																		
9.	Design how to implement wait() and signal() semaphore operations with examples.(16)	BTL-6	Creating																		
10.	Explain Deadlock detection with suitable example. (16)	BTL-4	Analyzing																		

11.	<p>Consider the snapshot of a system(16)</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th></th> <th>Max</th> <th>Allocation</th> <th>Available</th> </tr> <tr> <th></th> <th>A B C D</th> <th>A B C D</th> <th>A B C D</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>Answer the following Using Banker's algorithm,</p> <p>(i) Illustrate that the system is in safe state by demonstrating an order in which the processes may complete?</p> <p>(ii) If a request from process P1 arrives for(1,1,0,0) can the request be granted immediately?</p> <p>(iii) if the request from p4 arrives for(0,0,2,0) can the request be granted immediately?</p>		Max	Allocation	Available		A B C D	A B C D	A B C D	P0	2 0 0 1	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		BTL-5	Evaluating							
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12.	<p>(i) Illustrate deadlock with neat example.(6)</p> <p>(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.</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Process</th> <th colspan="3">Current Allocation</th> <th colspan="3">Maximum need</th> </tr> <tr> <th></th> <th>R1</th> <th>R2</th> <th>R3</th> <th>R1</th> <th>R2</th> <th>R3</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>Is the current allocation in a safe state? (10)</p>	Process	Current Allocation			Maximum need				R1	R2	R3	R1	R2	R3	P1	2	2	3	3	6	8	P2	2	0	3	4	3	3	P3	1	2	4	3	4	4	BTL-3	Applying
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13.	<p>Analyze the critical section problem and evaluate the effectiveness of the producer-consumer algorithm in ensuring process synchronization. (16)</p>	BTL-4	Analyzing																																			
14.	<p>Which of the following scheduling algorithms could result in starvation?</p> <p>(i) First-come, first-served (5)</p> <p>(ii) Shortest job first (5)</p> <p>(iii) Round robin (5)</p> <p>Detail with Justification.</p>	BTL-6	Creating																																			
15.	<p>Analyze deadlock conditions and evaluate the banker's algorithm as a deadlock avoidance technique. (16)</p>	BTL-5	Evaluating																																			
16.	<p>For below Processes table, calculate the average waiting time for the algorithms:</p> <p>(i) First Come First Serve (FCFS) (5)</p> <p>(ii) Shortest Job First (SJF) and (5)</p> <p>(iii) Priority Scheduling (6)</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Process</th> <th>Burst Time</th> <th>Priority</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>10</td> <td>3</td> </tr> <tr> <td>P2</td> <td>1</td> <td>1</td> </tr> <tr> <td>P3</td> <td>2</td> <td>4</td> </tr> <tr> <td>P4</td> <td>1</td> <td>5</td> </tr> <tr> <td>P5</td> <td>5</td> <td>2</td> </tr> </tbody> </table>	Process	Burst Time	Priority	P1	10	3	P2	1	1	P3	2	4	P4	1	5	P5	5	2	BTL-3	Applying																	
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17.	<p>Evaluate and explain the conditions for deadlock prevention.(16)</p>	BTL-5	Evaluating																																			

18.	<p>(i).Consider the following set of processes with the length of CPU burst time given in milliseconds.</p> <table border="1" data-bbox="453 264 1200 510"> <thead> <tr> <th>Process</th> <th>Burst Time</th> <th>priority</th> <th>Arrival Time</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>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)</p>	Process	Burst Time	priority	Arrival Time	P1	10	3	0	P2	1	1	1	P3	2	3	2	P4	1	4	1	P5	5	2	2	BTL-5	Evaluating
Process	Burst Time	priority	Arrival Time																								
P1	10	3	0																								
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19.	<p>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)</p>	BTL-4	Analyzing																								

20.	<p>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:</p> <table border="1" data-bbox="357 1093 1200 1326"> <thead> <tr> <th></th> <th colspan="4">Max</th> <th colspan="4">Allocation</th> <th colspan="4">Available</th> <th colspan="4">Need</th> </tr> <tr> <th></th> <th>A</th><th>B</th><th>C</th><th>D</th> <th>A</th><th>B</th><th>C</th><th>D</th> <th>A</th><th>B</th><th>C</th><th>D</th> <th>A</th><th>B</th><th>C</th><th>D</th> </tr> </thead> <tbody> <tr> <td>P0</td> <td>6</td><td>0</td><td>1</td><td>2</td> <td>4</td><td>0</td><td>0</td><td>1</td> <td>3</td><td>2</td><td>1</td><td>1</td> <td></td><td></td><td></td><td></td> </tr> <tr> <td>P1</td> <td>1</td><td>7</td><td>5</td><td>0</td> <td>1</td><td>1</td><td>0</td><td>0</td> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> <tr> <td>P2</td> <td>2</td><td>3</td><td>5</td><td>6</td> <td>1</td><td>2</td><td>5</td><td>4</td> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> <tr> <td>P3</td> <td>1</td><td>6</td><td>5</td><td>3</td> <td>0</td><td>6</td><td>3</td><td>3</td> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> <tr> <td>P4</td> <td>1</td><td>6</td><td>5</td><td>6</td> <td>0</td><td>2</td><td>1</td><td>2</td> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </tbody> </table> <p>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) (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)</p>		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									BTL-5	Evaluating
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21.	<p>Consider the following set of processes with the length of the CPU-burst time in given ms: all 5 processes arrive at time 0 in the order given.</p> <table border="1" data-bbox="619 293 911 510"> <thead> <tr> <th>Process</th> <th>Burst Time</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>10</td> </tr> <tr> <td>P2</td> <td>29</td> </tr> <tr> <td>P3</td> <td>03</td> </tr> <tr> <td>P4</td> <td>07</td> </tr> <tr> <td>P5</td> <td>12</td> </tr> </tbody> </table> <p>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)</p>	Process	Burst Time	P1	10	P2	29	P3	03	P4	07	P5	12	BTL-6	Creating
Process	Burst Time														
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P5	12														

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-2	Understanding																		
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-2	Understanding																		
6.	When is page replacement algorithm needed?	BTL-1	Remembering																		
7.	Does the optimal page replacement algorithm suffer from Belady's anomaly? State your answer.	BTL-2	Understanding																		
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.	What is contiguous memory allocation?	BTL-1	Remembering																		
12.	What is swapping in memory management?	BTL-1	Remembering																		
13.	<p>Consider the following Segmentation table.</p> <table border="1" data-bbox="328 1688 751 1917"> <thead> <tr> <th>Segment</th> <th>Base</th> <th>Length</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>219</td> <td>600</td> </tr> <tr> <td>1</td> <td>2300</td> <td>14</td> </tr> <tr> <td>2</td> <td>90</td> <td>100</td> </tr> <tr> <td>3</td> <td>1327</td> <td>580</td> </tr> <tr> <td>4</td> <td>1952</td> <td>96</td> </tr> </tbody> </table> <p>What are the physical addresses for the logical addresses 3400 and 0110?</p>	Segment	Base	Length	0	219	600	1	2300	14	2	90	100	3	1327	580	4	1952	96	BTL-2	Understanding
Segment	Base	Length																			
0	219	600																			
1	2300	14																			
2	90	100																			
3	1327	580																			
4	1952	96																			
14.	Define compaction in memory management.	BTL-1	Remembering																		

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-2	Understanding
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-1	Remembering
19.	State the significance of LDT and GDT in segmentation.	BTL-2	Understanding
20.	Why are page sizes always powers of 2?	BTL-2	Understanding
21.	List the steps required to handle a page fault in demand paging.	BTL-2	Understanding
22.	What do you meant by hit and miss in paging.	BTL-1	Remembering
23.	List the common strategies used to select a free memory hole.	BTL-1	Remembering
24.	How the problem of internal fragmentation can be solved?	BTL-2	Understanding
25.	What is Copy-on-Write (COW) in operating systems?	BTL-1	Remembering

PART - B

1.	Analyze the demand paging mechanism in an operating system and explain its working with a neat diagram. (16)	BTL-4	Analyzing
2.	Analyze how logical addresses are translated into physical addresses using the paging mechanism with a neat sketch. (16)	BTL-4	Analyzing
3.	Explain main memory management in detail with necessary diagram. (16)	BTL-3	Applying
4.	Analyze contiguous memory allocation and evaluate its advantages and limitations with a neat diagram. (16)	BTL-5	Evaluating
5.	Analyze scenarios in which the FIFO page replacement algorithm better than LRU and justify your answer. (16)	BTL-4	Analyzing
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, 112 KB, and 95 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-4	Analyzing
9.	Analyze the causes of thrashing, explain how it is detected, and evaluate techniques used to eliminate thrashing. (16)	BTL-5	Evaluating
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 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. (16)	BTL-4	Analyzing
13.	Discuss the given memory management techniques with diagrams. 1. Paging (8) 2. Translation Look-aside Buffer. (8)	BTL-3	Applying
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 page number 2 and offset of 128. Discuss about the possible valid-invalid bit and possible protection bits in page 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 found in TLB, what is the effective memory reference time? (Assume that finding a page entry in TLB takes 2ns, if entry is present) (6)	BTL-5	Evaluating
15.	Analyze the sequence of steps involved in handling a page fault and explain its impact on system performance. (16)	BTL-4	Analyzing
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 following replacement algorithms, assuming four frames? Remembering all frames are initially empty. (16) (i) LRU replacement (ii) FIFO replacement (iii) Optimal replacement.	BTL-4	Analyzing

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 frames are empty. (12) Explain the effect of thrashing. (4)	BTL-5	Evaluating
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 175KB 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.	Differentiate the various file access methods.	BTL-2	Understanding
2.	What is rotational latency?	BTL-1	Remembering
3.	List different types of directory structure.	BTL-2	Understanding
4.	Mention the common file types.	BTL-1	Remembering
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.	State whether FAT file system is advantageous.	BTL-2	Understanding

8.	List the ways in which information in a file can be accessed.	BTL-1	Remembering
9.	List 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.	State the advantages of bit vector free space management.	BTL-2	Understanding
13.	Differentiate between file and directory.	BTL-1	Remembering
14.	Define consistency checking in file systems.	BTL-1	Remembering
15.	Write Short notes on file system mounting.	BTL-2	Understanding
16.	State the advantage of the bit vector approach in free space management.	BTL-1	Remembering

17.	What is boot control block?	BTL-1	Remembering
18.	Define the backup and restore of a file system.	BTL-2	Understanding
19.	State two important functions of the Virtual File System (VFS) layer.	BTL-1	Remembering
20.	Differentiate contiguous allocation and linked allocation methods.	BTL-2	Understanding
21.	List the disk space allocation methods.	BTL-1	Remembering
22.	State the role of index files in direct access files.	BTL-2	Understanding
23.	List the common schemes used to define the logical structure of a directory.	BTL-1	Remembering
24.	Define a mass storage system and state how it differs from primary memory.	BTL-2	Understanding
25.	Define disk scheduling in an operating system.	BTL-1	Remembering
26.	What is the role of disk management in an operating system, and why is it important?	BTL-2	Understanding
27.	What is swap-space management, and how does it assist in managing memory in an operating system?	BTL-2	Understanding
PART - B			
1.	Analyze file sharing mechanisms and evaluate protection techniques used in file systems. (16)	BTL-5	Evaluating
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-3	Applying
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-	Applying
5.	Discuss about the various file access methods. (16)	BTL-3	Applying
6.	Explain in detail about file attributes and file operation. (16)	BTL-3	Applying
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.	(i) Why is it important to balance file system I/O among the disks and controllers on a system in a multitasking environment? (8) (ii) Discuss the advantages and disadvantages of supporting links to files that cross mount points. (8)	BTL-3	Applying
11.	Analyze disk allocation methods and evaluate disk management procedures with respect to performance and reliability.	BTL-4	Analyzing
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.	Analyze disk space allocation methods, fragmentation issues, and evaluate the role of FAT and inodes in efficient disk management. (16)	BTL-4	Analyzing
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 occur if a new file is created in the same storage area or with the same absolute path name? How these problems can be avoided? (16)	BTL-5	Evaluating
18.	(i) Evaluate Linked Allocation method. (8) (ii) 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.	Analyze application requirements for sequential and random file access and justify the choice of access method. (16)	BTL-4	Analyzing
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.	Analyze mass storage system architecture and evaluate its performance differences compared to primary memory. (16)	BTL-5	Evaluating
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-1	Remembering
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-1	Remembering
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-1	Remembering
14.	What is handle? How does a process obtain a handle?	BTL-1	Remembering
15.	What are the Components of a Linux System?	BTL-1	Remembering
16.	Which layer of iOS contains fundamental system services for apps?	BTL-2	Understanding
17.	What are the features of Linux file system?	BTL-2	Understanding
18.	Define the components of LINUX system	BTL-1	Remembering
19.	What scheduling algorithm is used in Linux to schedule jobs?	BTL-2	Understanding
20.	Which layer of iOS contains fundamental system services for apps?	BTL-2	Understanding
21.	Define Mobile os and ios	BTL-2	Understanding
22.	What is Android?	BTL-1	Remembering
23.	Difference between Mobile OS and IOS OS	BTL-2	Understanding
24.	Define File system.	BTL-1	Remembering
PART - B			
1.	Explain in detail about the concepts of Linux system. (16)	BTL-3	Applying
2.	Analyze the procedure for setting up a Linux mainframe server and evaluate the challenges involved. (16)	BTL-4	Analyzing
3.	Illustrate in detail about Linux host and adding guest OS. (16)	BTL-3	Applying
4.	Analyze the technical and administrative requirements needed to become a Linux system administrator and evaluate their importance. (16)	BTL-4	Analyzing
5.	Analyze the installation process of a Linux multifunction server and evaluate its configuration requirements. (16)	BTL-4	Analyzing
6.	Write about LINUX architecture and LINUX kernel with neat sketch. (16)	BTL-3	Applying
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-3	Applying
9.	With frame work explain the working function of android operating system architecture. Compare the feature of IoS and android. (16)	BTL-5	Evaluating
10.	Discuss the process and memory management in Linux. (16)	BTL-3	Applying
11.	Explain the architecture of iOS. Discuss the media and service layers clearly. (16)	BTL-3	Applying
12.	What are the primary goals of the conflict-resolution mechanism used by the Linux kernel for loading kernel modules? (16)	BTL-4	Analyzing

13.	Explain what are the Scheduling concepts followed by Linux environment. (16)	BTL-4	Analyzing
14.	Describe in detail the salient features of Linux I/O. (16)	BTL-3	Applying
15.	Write briefly about mobile OS and IOS in detail. (16)	BTL-3	Applying
16.	Illustrate and explain about the Android file management. (16)	BTL-3	Applying
17.	Explain the architecture of Android OS. (16)	BTL-5	Evaluating