



**MUTHAYAMMAL ENGINEERING COLLEGE**  
**(An Autonomous Institution)**  
 (Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated  
 to Anna University)  
 Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.



**MUST KNOW CONCEPTS**

**MKC**

**MCA**

**2021-22**

**Course Code & Course Name : 21CAB05 & Operating Systems**

**Year/Sem/Sec : I / I /-**

S.No.	Term	Notation (Symbol)	Concept / Definition / Meaning / Units / Equation / Expression	Units
<b>Unit-I : Introduction</b>				
1.	Operating System	-	<ul style="list-style-type: none"> <li>• It is software that works as an interface between a user and the computer hardware.</li> </ul>	I
2.	Types of Operating systems	-	<ul style="list-style-type: none"> <li>• Batched</li> <li>• Multi programmed</li> <li>• Timesharing</li> <li>• Distributed</li> <li>• Real Time</li> </ul>	I
3.	Kernel	-	Kernel is the core and essential part of computer operating system that provides basic services for all parts of OS.	I
4.	Process(Types)	-	Program in execution(OS Process and User Process)	I
5.	States of a Process	-	New, Running, Waiting, Ready, Terminated	I
6.	The main functions of an OS	-	<ul style="list-style-type: none"> <li>a. Process Management</li> <li>b. Memory Management</li> <li>c. Input/ Output Management</li> <li>d. Storage/ File system management</li> </ul>	I
7.	The main functions of a Kernel	-	<ul style="list-style-type: none"> <li>- Process management</li> <li>- Device management</li> <li>- Memory management</li> <li>- Interrupt handling</li> <li>- I/O communication</li> <li>- File system management</li> </ul>	I
8.	Daemon	-	Disk and execution monitor, is a process that runs in the background without user's interaction.	I

9.	Mainframe Systems	-	These systems are developed from the batch systems and then multi programming system and finally time sharing systems.	I
10.	Batch Systems	-	Operators batched together jobs with similar needs and ran through the computer as a group.	I
11.	Components of a Computer System	-	<ul style="list-style-type: none"> <li>• Application Programs</li> <li>• System Program</li> <li>• Operating System</li> <li>• Computer Hardware</li> </ul>	I
12.	Advantages of Multiprogramming	-	<ul style="list-style-type: none"> <li>• Increased System Throughput</li> <li>• Increased CPU utilization</li> </ul>	I
13.	Multiprocessor System	-	Multiprocessor systems have systems more than one processor for communication, sharing the computer bus, the memory, clock & peripheral devices	I
14.	Clustered System	-	Clustered systems are collection of multiple CPUs to accomplish computational work.	I
15.	Types of Clustering	-	<ul style="list-style-type: none"> <li>• Asymmetric Clustering</li> <li>• Symmetric Clustering</li> <li>• Clustering over a WAN</li> </ul>	I
16.	Asymmetric Clustering	-	The hot standby machine just monitors the active server and if that server fails, hot standby host become the active server	I
17.	System Libraries	-	System Libraries define a standard set of functions through which applications can interact with the kernel and that implement much of the operating system functionality that doesn't need the full privileges of kernel code.	I
18.	System Utilities	-	System Utilities are system programs that perform individual, specialized management tasks.	I
19.	System Calls	-	A system call is the programmatic way in which a computer program requests a service from the kernel of the operating system	I
20.	Process Synchronization	-	Process Synchronization means sharing system resources by processes in such a way that, Concurrent access to shared data is handled thereby minimizing the chance of inconsistent data.	I
21.	Context Switching	-	Context is associated with each process encompassing all the information describing the current execution state of the process	I
22.	Non-Preemptive algorithms	-	In this type of scheduling once a CPU has been allocated to a process it would not release the CPU till a request for termination or switching to waiting state occurs	I
23.	Preemptive algorithms	-	In this type of scheduling a process maybe interrupted during execution and the CPU	I

			maybe allocated to another process.	
24.	Co-operating Process	-	If a process can affect or be affected by the other processes executing in the system, that process which shares data with other process is called as Co-operating process.	I
25.	Interprocess Communication	-	Interprocess communication is the mechanism provided by the operating system that allows processes to communicate with each other.	I
<b>Unit-II : Process Scheduling &amp; Synchronization</b>				
26.	Turnaround Time	-	Amount of time to execute a particular process	II
27.	Waiting Time	-	Amount of time a process has been waiting in the ready queue	II
28.	Response Time	-	Amount of time it takes from when a request was submitted until the first response is produced, not output (for time-sharing environment)	II
29.	Real-time Systems	-	A real time process is a process that must respond to the events within a certain time period.	II
30.	Long-term Scheduler	-	Long term schedulers are the job schedulers that select processes from the job queue and load them into memory for execution.	II
31.	Short-term Scheduler	-	The short term schedulers are the CPU schedulers that select a process from the ready queue and allocate the CPU to one of them.	II
32.	Compaction	-	Compaction is a process in which the free space is collected in a large memory chunk to make some space available for processes.	II
33.	Dispatcher	-	Dispatcher module gives control of the CPU to the process selected by the short-term scheduler.	II
34.	Multithreading	-	Multithreading is a process of executing more than one thread simultaneously	II
35.	Starvation	-	Starvation is Resource management problem where a process does not get the resources it needs for a long time because the resources are being allocated to other processes.	II
36.	Deadlock	-	Deadlock is a situation or condition the two processes are waiting for each other to complete so that they can start. This result both the processes to hang.	II
37.	Monitor	-	The monitor is a body of code that can be executed by only one thread at a time.	II
38.	Thread Pool	-	Thread Pool is a pool of threads that reuses a fixed number of threads to execute the specific task	II

39.	Semaphores	-	Semaphore is a synchronization toll. A semaphore S is an integer variable that apart from initialization is accessed only through 2 standard atomic operations. x Wait x Signal	II
40.	3 different types of Scheduling Queues	-	<b>Job Queue:</b> As process enters the system they are put into job queue. <b>Ready Queue:</b> The processes that are residing in the main memory and are ready and waiting to execute are kept in the queue <b>Device Queue:</b> The list of processes waiting for particular I/O device is called a device queue.	II
41.	Benefits of Multithreaded Programming	-	<ul style="list-style-type: none"> <li>• Responsiveness</li> <li>• Resource sharing</li> <li>• Economy</li> <li>• Utilization of multiprocessor architecture</li> </ul>	II
42.	Critical Section Problem	-	Consider a system consists of 'n' processes. Each process has segment of Code called a critical section, in which the process may be changing common variables, updating a table, writing a file.	II
43.	Busy Waiting and Spinlock	-	<ul style="list-style-type: none"> <li>✓ When a process is in its critical section, any other process that tries to enter its critical section must loop continuously in the entry code.</li> <li>✓ This is called as busy waiting and this type of semaphore is also called a spinlock, because the process while waiting for the lock</li> </ul>	II
44.	Entry section	-	The critical section problem is to design a protocol that the processes can use to cooperate.	II
45.	Exit section	-	The critical section is followed by an exit section.	II
46.	Independent process	-	A Process is Independent if it cannot affect or be affected by the other processes executing in the system.	II
47.	I/O-bound process	-	An I/O-bound process spends more of its time doing I/O than it spends doing computations .	II
48.	CPU-bound process	-	A CPU-bound process generates I/O requests infrequently using more of its time doing computation than an I/O processes	II
49.	Race Condition	-	When several process access and manipulate same data concurrently, then the outcome of the execution depends on particular order in which the access takes place is called race condition	II
50.	Mutual Exclusion	-	Mutual exclusion is a property of process synchronization which states that "no two	II

			processes can exist in the critical section at any given point of time”.	
<b>Unit-III : Memory Management</b>				
51.	Virtual Memory	-	Virtual memory is hardware technique where the system appears to have more memory that it actually does	III
52.	Thrashing	-	It is a phenomenon in virtual memory schemes when the processor spends most of its time swapping pages, rather than executing instructions.	III
53.	Logical Address Space	-	Logical address space is generated from CPU; it bound to a separate physical address space is central to proper memory management	III
54.	Physical Address Space	-	Physical address space is seen by time. The memory unit. Logical address space is virtual address space.	III
55.	Throughput	-	Number of processes that complete their execution per time unit	III
56.	Fragmentation	-	Fragmentation is memory wasted.	III
57.	Belady's Anomaly	-	Belady's anomaly is an anomaly with some page replacement policies where increasing the number of page frames results in an increase in the number of page faults.	III
58.	Paging	-	Paging is used to solve the external fragmentation problem in operating system.	III
59.	Demand Paging	-	Demand paging specifies that if an area of memory is not currently being used, it is swapped to disk to make room for an application's need.	III
60.	Banker's Algorithm	-	Banker's algorithm is used to avoid deadlock.	III
61.	Swapping	-	Processes can be copied from main memory to a backing store, and then copied back later.	III
62.	Direct Access Method	-	Direct Access method is based on a disk model of a file, such that it is viewed as a numbered sequence of blocks or records.	III
63.	File	-	A collection of data or information that has a name, called the filename. information stored in a computer must be in a file.	III
64.	Segmentation	-	The chunks that a program is divided into which are not necessarily all of the same sizes are called segments.	III
65.	Compaction	-	Compaction means movement of these pieces close to each other to form a larger chunk of memory which works as a resource to run larger processes	III

66.	Page Frames	-	Page frames are the fixed size contiguous areas into which the main memory is divided by the virtual memory.	III
67.	Function of Paging	-	Paging is a memory management scheme that permits the physical-address space of a process to be non contiguous.	III
68.	Fragmentation	-	Fragmentation is memory wasted.	III
69.	Overlays	-	Overlays are used to enable a process to be larger than the amount of memory allocated to it.	III
70.	Page Replacement	-	A page replacement algorithm is needed to decide which page needs to be replaced when new page comes in.	III
71.	Page Fault	-	A page fault happens when a running program accesses a memory page that is mapped into the virtual address space, but not loaded in physical memory.	III
72.	Lazy Swapper	-	A lazy swapper never swaps a page into memory unless that page will be needed.	III
73.	Various Page Replacement Algorithms used for Page Replacement	-	FIFO page replacement, Optimal page replacement, LRU page replace	III
74.	External Fragmentation	-	External fragmentation exists when enough total memory space exists to satisfy a request.	III
75.	Internal Fragmentation	-	When the allocated memory may be slightly larger than the requested memory, the difference between these two numbers is internal fragmentation.	III
<b>Unit-IV : Disk Scheduling and File Management</b>				
76.	Disk Scheduling	-	The technique that operating system uses to determine the request which is to be satisfied next is called disk scheduling.	IV
77.	Interrupt	-	An Interrupt is an event that alters the sequence in which a processor executes instructions.	IV
78.	What are the various Disk-Scheduling Algorithms	-	First Come First Served Scheduling, Shortest Seek Time First Scheduling, SCAN Scheduling, C-SCAN Scheduling	IV
79.	Free Space Management	-	The system keeps tracks of the free disk blocks for allocating space to files when they are created.	IV
80.	Seek Time	-	Seek time is the time taken for a hard disk controller to locate a specific piece of stored data.	IV
81.	Latency Time	-	Latency is the time it takes for the beginning of the required sector to reach the head.	IV
82.	Cache Memory	-	Cache Memory is a special very high-speed memory.	IV



83.	Device drivers	-	(i) Character devices such as printers, terminals (ii) Block devices (including all disk drives) and network interface devices.	IV
84.	Buffer cache	-	It is the kernel's main cache for block-oriented devices such as disk drives and is the main mechanism through which I/O to these devices is performed	IV
85.	C-SCAN Scheduling	-	C-SCAN means Circular SCAN algorithm. This Scheduling is a variant of SCAN designed to provide a more waiting time.	IV
86.	SCAN Scheduling	-	<ul style="list-style-type: none"> <li>✓ In the SCAN algorithm, the disk arm starts at one end of the disk and moves toward the other end of the disk.</li> <li>✓ At the other end, the direction of head movement is reversed and servicing continues across the disk.</li> </ul>	IV
87.	FCFS Scheduling	-	This algorithm serves the first come process always and is does not provide Fast service	IV
88.	SSTF Scheduling	-	SSTF Algorithm selects the request with the minimum seek time from the current head position.	IV
89.	Types of Disk Scheduling	-	<ul style="list-style-type: none"> <li>(i).SSTF Scheduling</li> <li>(ii).FCFS Scheduling</li> <li>(iii) SCAN Scheduling</li> <li>(iv).C-SCAN Scheduling</li> <li>(v).LOOK Scheduling.</li> </ul>	IV
90.	Characteristics of Disk Scheduling	-	<ul style="list-style-type: none"> <li>1) Throughput</li> <li>2) Mean Response Time</li> <li>3) Variance of Response time</li> </ul>	IV
91.	Why Disk Scheduling necessary	-	To avoid Disk arbitration which occurs when many processes try to read or write the records on disks at the same time, Disk Scheduling is necessary.	IV
92.	Buffering	-	The act of storing data temporarily in the buffer is called buffering.	IV
93.	Library	-	It is a file which contains object code for subroutines and data to be used by the other program	IV
94.	Goal of Disk Scheduling Algorithm	-	Fairness, High throughout, Minimal traveling head time	IV
95.	The various File Attributes	-	A file has certain other attributes, which vary from one operating system to another, but typically consist of these: Name, identifier, type, location, size, protection, time, date and user identification	IV
96.	The various File Operation	-	<ul style="list-style-type: none"> <li>• Creating a file</li> <li>• Writing a file</li> </ul>	IV

			<ul style="list-style-type: none"> <li>• Reading a file</li> <li>• Repositioning within a file</li> <li>• Deleting a file</li> <li>• Truncating</li> </ul>	
97.	Directory	-	The device directory or simply known as directory records information- such as name, location, size, and type for all files on that particular partition.	IV
98.	Path Name	-	A pathname is the path from the root through all subdirectories to a specified file. In a two-level directory structure a user name and a file name define a path name	IV
99.	Access Control List	-	The most general scheme to implement identity-dependent access is to associate with each file and directory an access control unit	IV
100.	Various logical structures of a Directory	-	<ul style="list-style-type: none"> <li>• Single-level Directory</li> <li>• Two-level Directory</li> <li>• Tree Structured Directory</li> <li>• Acyclic-Graph Directory</li> <li>• General Graph Directory</li> </ul>	IV
<b>Unit-V : Case Studies</b>				
101.	Function of Module management	-	The module management allows modules to be loaded into memory and to talk to the rest of the kernel.	V
102.	Kernel in Linux system	-	Kernel is responsible for maintaining all the important abstractions of the operating system including such things as virtual memory and processes.	V
103.	Personality	-	Process Personalities are primarily used by emulation libraries to request that system call be compatible with certain versions of UNIX	V
104.	Main support for the Linux modules	-	The Module support under Linux has three components. They are : (i). Module Management (ii)Driver Registration (iii)Conflict Resolution mechanism.	V
105.	Components of a Linux System	-	Linux System composed of three main modules. They are : (i).Kernel (ii).System libraries (iii).System utilities	V
106.	Data Striping	-	Data Stripping means splitting the bits of each byte across multiple disks	V
107.	Boot Disk	-	A Disk that has a boot partition is called as Boot Disk.	V
108.	Shell	-	The shell takes commands from the user and executes kernel's functions.	V
109.	Utilities	-	Utility programs that provide the user most of the functionalities of an operating systems.	V
110.	What is Android Runtime?	-	Android Runtime (ART) is an application	V



			runtime environment used by the Android operating system.	
111.	What is UNIX shell?	-	A Unix shell is a command-line interpreter or shell that provides a command line user interface for Unix-like operating systems.	V
112.	Process -ID	-	PID's are used to specify processes to the operating system when an application makes a system call to signal, modify or wait for another process.	V
113.	Type of LINUX device classes.	-	i) Character Devices ii) Block Devices iii) Network interfaces	V
114.	Parallel Clusters	-	Parallel clusters allow multiple hosts to access the same data on the shared storage.	V
115.	Fork	-	Fork is a System calls by which a new process is created	V
116.	Exec	-	Exec is also a System call, which is used after a fork by one of the two processes to replace the process memory space with a new program.	V
117.	Address binding.	-	Address binding is the process of mapping the program's logical or virtual addresses to corresponding physical or main memory addresses.	V
118.	Virtualization	-	Virtualization is the creation of a virtual -- rather than actual -- version of something, such as an operating system, a server, a storage device or network resources.	V
119.	What scheduling algorithm is used in Linux to schedule jobs?	-	It handles CPU resource allocation for executing processes, and aims to maximize overall CPU utilization while also maximizing interactive performance.	V
120.	List some of the Linux Network services.	-	NTPD – Network Time Protocol Daemon HTTPD – Hyper Text Transfer Protocol Daemon SSHD – Secure SHell Daemon sendmail - Mail Server Daemon	V
121.	What are the requirements for Linux system administrator?	-	Linux file systems • File system hierarchy • Handling files and directories • System Management, etc.	V
122.	Conflict Resolution	-	A mechanism that allows different device drivers to, reserve hardware resources and to protect those resources from accidental use by another driver.	V
123.	Hypervisor.	-	A hypervisor or virtual machine monitor (VMM) is computer software, firmware or hardware that Creatings and runs virtual machines.	V
124.	Guest Operating System	-	A guest OS is the software installed on either a virtual machine (VM) or partitioned disk that describes an operating system that is different than the host operating system.	V

125.	Demand-Zero Memory	-	"Demand zero" memory is a sections of memory that exist only as virtual memory, without existing anywhere as physical memory nor backed anywhere on disk.	V
<b>Placement Questions</b>				
126.	Domain Name System	-	DNS server or Domain Name Server is used to map the internet names to an IP address. The system distributes data and the naming of hosts hierarchically in a domain name space.	
127.	Binary Semaphore	-	A binary semaphore is one, which takes only 0 and 1 as values and They are used to implement mutual exclusion and synchronize concurrent processes.	
128.	Thrashing	-	It is a phenomenon in virtual memory schemes when the processor spends most of its time swapping pages, rather than executing instructions.	
129.	Long Term Scheduler	-	Long term scheduler determines which programs are admitted to the system for processing and It controls the degree of multiprogramming.	
130.	Medium Term Scheduling	-	Medium term scheduling is part of the swapping function and this relates to processes that are in a blocked or suspended state.	
131.	Short Term Scheduler	-	Short term scheduler, also know as a dispatcher executes most frequently, and makes the finest-grained decision of which process should execute next.	
132.	Turnaround Time	-	Turnaround time is the interval between the submission of a job and its completion	
133.	Response Time	-	Response time is the interval between submission of a request, and the first response to that request.	
134.	User Data	-	Modifiable part of user space and it May include program data, user stack area, and programs that may be modified.	
135.	System Stack	-	Each process has one or more LIFO stacks associated with it and it is Used to store parameters and calling addresses for procedure and system calls.	
136.	Process Control Block	-	Info needed by the OS to control processes.	
137.	System in Safe State	-	The set of dispatchable processes is in a safe state if there exists at least one temporal order in which all processes can be run to completion without resulting in a deadlock.	
138.	Busy Waiting	-	The repeated execution of a loop of code while waiting for an event to occur is called busy-waiting.	

139.	Load Sharing	-	load balancing refers to a scheme where work is allocated to processors on a more permanent basis.
140.	Gang Scheduling	-	A set of related threads is scheduled to run on a set of processors at the same time, on a 1-to-1 basis.
141.	Dedicated processor assignment	-	Provides implicit scheduling defined by assignment of threads to processors
142.	Dynamic Scheduling	-	The number of thread in a program can be altered during the course of execution
143.	Rendezvous	-	In message passing, it is the condition in which, both, the sender and receiver are blocked until the message is delivered.
144.	Trap and Trapdoor	-	Trapdoor is a secret undocumented entry point into a program used to grant access without normal methods of access authentication. A trap is a software interrupt, usually the result of an error condition.
145.	Page Cannibalizing	-	Page swapping or page replacements are called page cannibalizing
146.	Process Spawning	-	When the OS at the explicit request of another process creates a process, this action is called process spawning.
147.	Process migration	-	It is the transfer of sufficient amount of the state of process from one machine to the target machine.
148.	Mutant	-	In Windows NT a mutant provides kernel mode or user mode mutual exclusion with the notion of ownership
149.	FtDisk	-	It is a fault tolerance disk driver for Windows NT.
150.	Thread	-	The special thread a dispatcher will execute when no ready thread is found.

**Faculty Prepared**

**Dr.C. Sivaprakasam**

**Signature**

**HoD**