Reg. No.																

Question Paper Code	13199

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

Third Semester

Artificial Intelligence and Data Science

(Common to Fourth Semester - Computer Science and Engineering & Information Technology)

20CSPC401 - OPERATING SYSTEMS

Regulations - 2020

Duration: 3 Hours Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

		Marks	*K – Level*	*CO*
1.	Which component directly executes the instructions of a computer program? (a) CPU (b) Memory (c) Hard Disk (d) Cache	*1*	*K1*	*CO1*
2.	What is the main purpose of cache memory in a computer system? (a) To store data permanently (b) To provide extra storage space (c) To reduce access time to frequently used data (d) To increase processing speed by parallel execution	*1*	*K1*	*CO1*
3.	Which type of interrupt is generated by an external device? (a) Software interrupt (b) Hardware interrupt (c) Timer interrupt (d) System interrupt	*1*	*K1*	*CO1*
4.	Which scheduling algorithm is designed to work efficiently for time-sharing systems? (a) First Come First Serve (FCFS) (b) Shortest Job First (SJF) (c) Round Robin (RR) (d) Priority Scheduling	*1*	*K1*	*CO2*
5.	In process scheduling, which criterion measures the average time a process spends in the system? (a) Waiting Time (b) Turnaround Time (c) Response Time (d) Throughput	*1*	*K1*	*CO2*
6.	What is a primary benefit of using threads in an application? (a) Enhanced security (b) Parallelism within a single process (c) Simplified coding (d) Increased memory usage	*1*	*K1*	*CO2*
7.	What mechanism can ensure that only one process accesses critical section at a time? (a) Deadlock (b) Mutex (c) Paging (d) Multithreading	*1*	*K1*	*CO3*
8.	Which of the following is a classic synchronization problem? (a) Dining Philosophers Problem (b) Page Replacement Problem (c) File System Mounting (d) Demand Paging	*1*	*K1*	*CO3*
9.	Which is NOT a strategy for handling deadlocks? (a) Deadlock Prevention (b) Deadlock Detection (c) Deadlock Scheduling (d) Deadlock Avoidance	*1*	*K1*	*CO3*
10.	In memory management, which method divides memory into fixed-size blocks? (a) Segmentation (b) Paging (c) Swapping (d) Contiguous Allocation	*1*	*K1*	*CO4*
11.	Which technique allows for more efficient use of memory by moving processes back and forth between main memory and disk? (a) Paging (b) Segmentation (c) Swapping (d) Fragmentation	*1*	*K1*	*CO4*
12.	What is the main purpose of virtual memory in an operating system? (a) To increase the physical size of the RAM (b) To simulate more memory than physically available (c) To reduce the load on CPU (d) To store frequently used files	*1*	*K1*	*CO4*
13.	What is the role of the file system in an operating system? (a) Managing the CPU resources (b) Organizing and storing files on a disk (c) Monitoring system performance (d) Ensuring secure network communication	*1*	*K1*	*CO5*

14.	In file systems, which structure manages the organization and hierarchy of files? (a) Disk Structure (b) Cache Memory (c) Directory Structure (d) File Mounting	*1*	*K1*	*CO5*
15.	Which I/O scheduling algorithm minimizes seek time by moving the disk arm back and forth? (a) FCFS (b) SCAN (c) SSTF (d) Round Robin	*1*	*K1*	*CO5*
16.	What does the acronym 'DMA' stand for in OS memory management? (a) Direct Machine Access (b) Direct Memory Allocation (c) Direct Memory Access (d) Distributed Memory Allocation	*1*	*K1*	*CO5*
17.	Which layer in iOS handles the communication between hardware and applications? (a) Core OS Layer (b) Media Layer (c) Application Layer (d) Service Layer	*1*	*K1*	*CO6*
18.	Which file system is commonly used in the Linux operating system? (a) FAT32 (b) NTFS (c) EXT4 (d) HFS+	*1*	*K1*	*CO6*
19.	In Linux, which component is responsible for scheduling and managing resources among processes? (a) Kernel (b) User Interface (c) Application Layer (d) Virtual Machine	*1*	*K1*	*CO6*
20.	In Android architecture, which layer contains libraries that support media, graphics, and other core components? (a) Application Layer (b) Kernel Layer (c) Services Layer (d) Media Layer	*1*	*K1*	*CO6*

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

21.	Briefly explain the purpose of an interrupt in a computer system.	*2*	*K2*	*CO1*
22.	What are system calls, and why are they important in an operating system?	*2*	*K1*	*CO1*
23.	Define the term ‘process’ and explain its significance in an operating system.	*2*	*K1*	*CO2*
24.	List any two CPU scheduling algorithms and describe their key features.	*2*	*K1*	*CO2*
25.	Explain the term ‘critical section’ and why it is important in process synchronization.	*2*	*K2*	*CO3*
26.	What are the four necessary conditions for a deadlock?	*2*	*K1*	*CO3*
27.	Describe the process of swapping in memory management.	*2*	*K2*	*CO4*
28.	Differentiate between paging and segmentation.	*2*	*K2*	*CO4*
29.	What is meant by disk scheduling, and why is it needed in an operating system?	*2*	*K1*	*CO5*
30.	Outline the core layers of iOS architecture.	*2*	*K2*	*CO6*

PART - C (6 × 10 = 60 Marks)

Answer ALL Questions

31.	a)	Discuss the evolution of operating systems, highlighting key advancements	*10*	*K2*	*CO1*
		OR			
	b) i)	Describe the structure and functions of an operating system.	*5*	*K2*	*CO1*
	ii)	Explain the role of system calls and system programs in facilitating OS and hardware interaction.	*5*	*K2*	*CO1*
32.	a)	Apply different CPU scheduling algorithms to real-life examples and analyze their effectiveness.	*10*	*K4*	*CO2*
		OR			
	b)	Explain multithreading models and analyze how each model handles concurrent processing.	*10*	*K4*	*CO2*
33.	a)	Explain the critical section problem and apply synchronization techniques to solve it.	*10*	*K2*	*CO3*
		OR			

	b)	Describe deadlock detection and apply recovery methods to resolve deadlocks in given scenarios.	*10*	*K2*	*CO3*
34.	a)	Analyze virtual memory concepts and evaluate different page replacement algorithms.	*10*	*K4*	*CO4*
		OR			
	b)	Compare and evaluate segmentation with paging in 64-bit architectures, emphasizing advantages and challenges.	*10*	*K4*	*CO4*
35.	a)	Describe different disk scheduling algorithms and analyze their performance with examples.	*10*	*K2*	*CO5*
		OR			
	b)	Explain file system implementation and analyze the importance of directory organization and file protection.	*10*	*K2*	*CO5*
36.	a)	Explain the design principles of the Linux OS and analyze how its memory and file management differs from other systems.	*10*	*K2*	*CO6*
		OR			
	b)	Describe the architecture of iOS and Android, and analyze the core differences in their system layers.	*10*	*K2*	*CO6*