Course Code: 23CS0511 **R23**

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
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QUESTION BANK (DESCRIPTIVE)

Subject with Code: **OPERATING SYSTEMS (23CS0511)** Course & Branch: **B.Tech – CSE,CCC,CIC,CIA**
Regulation: **R23** Year &Sem: **II-B.Tech & II-Sem**

UNIT –I

OPERATING SYSTEMS OVERVIEW & SYSTEM STRUCTURES

1	a)	Define Operating System.	**[L1][CO1]**	**[2M]**
	b)	How is Computer systems divided? List and define.	**[L1][CO1]**	**[2M]**
	c)	List and define the Operating system modes of operations	**[L1][CO1]**	**[2M]**
	d)	What is a System Call?	**[L1][CO1]**	**[2M]**
	e)	What is Booting? List and define its types.	**[L1][CO1]**	**[2M]**
2	a)	List and discuss the different functions of an operating system	**[L2][CO1]**	**[5M]**
	b)	Explain different operations performed by the operating system.	**[L2][CO1]**	**[5M]**
3		Discuss the types of Operating System in detail.	**[L2][CO1]**	**[10M]**
4		Describe various Computing Environments available.	**[L2][CO1]**	**[10M]**
5	a)	Define Free and Open-Source Operating Systems. How does Open-Source Operating System work? List the Advantages and Disadvantages of Open-Source Operating System.	**[L2][CO1]**	**[6M]**
	b)	Analyze the User and Operating-System Interfaces available	**[L4][CO1]**	**[4M]**
6		List and explain the common services provided by an operating system with neat diagram.	**[L2][CO1]**	**[10M]**
7	a)	Explain why you need system calls in Operating System and how they work.	**[L2][CO1]**	**[5M]**
	b)	Evaluate the importance of system programs in the computing environments.	**[L5][CO1]**	**[5M]**
8		Analyze the different types of System calls available in OS	**[L4][CO1]**	**[10M]**
9	a)	Imagine you're developing a lightweight open-source operating system. What key design goals would you prioritize, and how would you implement them?	**[L2][CO1]**	**[5M]**
	b)	Illustrate any two operating system structures.	**[L3][CO1]**	**[5M]**
10	a)	Design a boot sequence for an operating system and outline the steps involved in system start up.	**[L6][CO1]**	**[5M]**
	b)	How would you use log files, core dumps, and trace listings to debug a system that is intermittently failing?	**[L2][CO1]**	**[5M]**

Course Code: 23CS0511 **R23**

UNIT –II

PROCESSES, THREADS AND CONCURRENCY & CPU SCHEDULING

<table>
<tr><td>1</td><td>a)</td><td>Define Process and give its structure in memory</td><td>[L1][CO2]</td><td>[2M]</td></tr>
<tr><td></td><td>b)</td><td>Interpret the difference between preemptive and non-preemptive scheduling.</td><td>[L4][CO4]</td><td>[2M]</td></tr>
<tr><td></td><td>c)</td><td>List Scheduling Criteria</td><td>[L1][CO4]</td><td>[2M]</td></tr>
<tr><td></td><td>d)</td><td>Describe Gantt chart with an example.</td><td>[L1][CO2]</td><td>[2M]</td></tr>
<tr><td></td><td>e)</td><td>What is meant by convoy effect?</td><td>[L1][CO2]</td><td>[2M]</td></tr>
<tr><td>2</td><td>a)</td><td>With a neat sketch, explain process state diagram.</td><td>[L2][CO2]</td><td>[5M]</td></tr>
<tr><td></td><td>b)</td><td>Explain Process Control Block with neat diagram.</td><td>[L2][CO2]</td><td>[5M]</td></tr>
<tr><td>3</td><td>a)</td><td>What are scheduling queues in operating systems, and how do they manage processes during execution?</td><td>[L2][CO4]</td><td>[5M]</td></tr>
<tr><td></td><td>b)</td><td>Describe about the different types of Schedulers in operating system.</td><td>[L2][CO4]</td><td>[5M]</td></tr>
<tr><td>4</td><td>a)</td><td>Describe Context Switching and the types of context switching triggers in detail.</td><td>[L2][CO1]</td><td>[5M]</td></tr>
<tr><td></td><td>b)</td><td>Give the difference between Process and Thread</td><td>[L4][CO1]</td><td>[5M]</td></tr>
<tr><td>5</td><td></td><td>Analyze the different types of process operations in operating system.</td><td>[L4][CO1]</td><td>[10M]</td></tr>
<tr><td>6</td><td>a)</td><td>Examine in detail about Inter Process Communication.</td><td>[L4][CO1]</td><td>[5M]</td></tr>
<tr><td></td><td>b)</td><td>Define thread. Analyze the difference between User-Level & Kernel-Level Thread</td><td>[L2][CO1]</td><td>[5M]</td></tr>
<tr><td>7</td><td>a)</td><td>Discuss multithreading models with neat diagrams</td><td>[L2][CO1]</td><td>[2M]</td></tr>
<tr><td></td><td>b)</td><td>Explain in detail about Thread Libraries and its implementations</td><td>[L2][CO1]</td><td>[5M]</td></tr>
<tr><td>8</td><td>a)</td><td>What are common threading issues in concurrent programming, and how can they be effectively prevented or managed?</td><td>[L2][CO1]</td><td>[5M]</td></tr>
<tr><td></td><td>b)</td><td>Evaluate FCFS CPU Scheduling algorithm for given Problem:
<table>
<tr><td>Process</td><td>P1</td><td>P2</td><td>P3</td><td>P4</td></tr>
<tr><td>Process Time</td><td>24</td><td>3</td><td>5</td><td>6</td></tr>
</table></td><td>[L5][CO4]</td><td>[5M]</td></tr>
<tr><td>9</td><td>a)</td><td>Consider 3 processes P1, P2 and P3, which require 5, 7 and 4 time units and arrive at time 0, 1 and 3. Draw the Gant chart calculate averages process completion and average waiting time using SJF scheduling algorithm.</td><td>[L2][CO4]</td><td>[5M]</td></tr>
<tr><td></td><td>b)</td><td>Deploy SRJF CPU Scheduling algorithms for given Problem:
<table>
<tr><td>Process</td><td>P1</td><td>P2</td><td>P3</td><td>P4</td></tr>
<tr><td>Burst Time</td><td>8</td><td>10</td><td>3</td><td>4</td></tr>
<tr><td>Arrival Time</td><td>0</td><td>4</td><td>4</td><td>10</td></tr>
</table></td><td>[L5][CO4]</td><td>[5M]</td></tr>
<tr><td>10</td><td>a)</td><td>Build Priority CPU Scheduling algorithms for given Problem:
<table>
<tr><td>Process</td><td>P1</td><td>P2</td><td>P3</td><td>P4</td></tr>
<tr><td>Process Time</td><td>8</td><td>4</td><td>9</td><td>5</td></tr>
<tr><td>Priority</td><td>3</td><td>2</td><td>4</td><td>1</td></tr>
</table></td><td>[L6][CO4]</td><td>[5M]</td></tr>
<tr><td></td><td>b)</td><td>Evaluate Round Robin CPU Scheduling algorithm for given Problem: Time slice =3 ms.
<table>
<tr><td>Process</td><td>P1</td><td>P2</td><td>P3</td><td>P4</td></tr>
<tr><td>Process Time</td><td>10</td><td>5</td><td>18</td><td>6</td></tr>
<tr><td>Arrival Time</td><td>5</td><td>3</td><td>0</td><td>4</td></tr>
</table></td><td>[L5][CO4]</td><td>[5M]</td></tr>
<tr><td>11</td><td></td><td>Illustrate the scheduling strategy for a modern cloud-based system that effectively handles both CPU-bound and I/O-bound processes using multiple processors.</td><td>[L3][CO4]</td><td>[10M]</td></tr>
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Course Code: 23CS0511 **R23**

UNIT –III

SYNCHRONIZATION TOOLS & DEADLOCKS

1	a)	List and define the conditions that critical section problem must satisfy.	**[L1][CO3]**	**[2M]**
	b)	Give the benefits and drawbacks of Mutex Locks.	**[L1][CO3]**	**[2M]**
	c)	What is Resource-Allocation Graphs? List its properties.	**[L1][CO5]**	**[2M]**
	d)	Describe Deadlock and the methods to handling them.	**[L1][CO5]**	**[2M]**
	e)	Give the difference between deadlock and starvation.	**[L4][CO5]**	**[2M]**
2		What is critical section problem? Explain with example.	**[L2][CO3]**	**[10M]**
3		Define process synchronization and explain Peterson solution algorithms.	**[L2][CO3]**	**[10M]**
4		Discuss in detail about the hardware-based solution for synchronization.	**[L2][CO3]**	**[10M]**
5		What are Mutex Locks? List its Components and analyze the different types with example.	**[L4][CO3]**	**[10M]**
6	a)	What is Semaphore? Explain its types with example.	**[L2][CO3]**	**[5M]**
	b)	Explain producer consumer problem using semaphore.	**[L2][CO3]**	**[5M]**
7	a)	Describe how monitor achieve process synchronization. Also, mention its advantages and disadvantages.	**[L2][CO3]**	**[5M]**
	b)	Discuss in detail about the Reader and Writer Problem using semaphore	**[L2][CO3]**	**[5M]**
8	a)	Illustrate Bounded Buffer Problem using semaphore	**[L3][CO3]**	**[5M]**
	b)	What is Deadlock? Discuss its system Model and characterization.	**[L2][CO5]**	**[5M]**
9		Explain the solutions for Dining-Philosophers Problem.	**[L2][CO5]**	**[10M]**
10	a)	Suppose there are 2 copies of resource A, 3 copies of resource B, and 3 copies of resource C. Suppose further that process 1 holds one unit of resources B and C and is waiting for a unit of A; that process 2 is holding a unit of A and waiting on a unit of B; and that process 3 is holding one unit of A, two units of B, and one unit of C. (a) Draw the resource allocation graph with description. (b) Is the system in a deadlocked state? Why or why not?	**[L6][CO5]**	**[5M]**
	b)	Describe about Deadlock Prevention Methods.	**[L2][CO5]**	**[5M]**
11		Explain the Banker's algorithm for deadlock avoidance with an example.	**[L2][CO5]**	**[10M]**
12	a)	Illustrate Dead lock detection by Banker's Algorithm with Example.	**[L3][CO5]**	**[5M]**
	b)	Describe deadlock recovery and how it is performed.	**[L2][CO5]**	**[5M]**

Course Code: 23CS0511 **R23**

UNIT –IV

MEMORY-MANAGEMENT STRATEGIES, VIRTUAL MEMORY MANAGEMENT & STORAGE MANAGEMENT

1	a)	List out the methods involved in memory management.	**[L1][CO6]**	**[2M]**
	b)	Describe virtual memory with neat diagram.	**[L1][CO6]**	**[2M]**
	c)	What is meant by Paging and Page fault?	**[L1][CO6]**	**[2M]**
	d)	Discuss Belady's Anomaly phenomenon in OS.	**[L1][CO6]**	**[2M]**
	e)	What is Seek time and Rotational Latency?	**[L1][CO6]**	**[2M]**
2	a)	What is memory management? List and discuss about various techniques of managing memory in operating systems.	**[L2][CO6]**	**[5M]**
	b)	Explain about contiguous memory allocation in detail	**[L2][CO6]**	**[5M]**
3		What is paging in operating systems, and how does it help manage memory efficiently? Give example.	**[L2][CO6]**	**[10M]**
4		Explain the different techniques used to structure page tables in operating systems, and how do they help manage large address spaces efficiently?	**[L2][CO6]**	**[10M]**
5	a)	Describe about Swapping in memory management with its advantage and disadvantages.	**[L2][CO6]**	**[5M]**
	b)	Analyze the difference between Paging and Segmentation.	**[L4][CO6]**	**[5M]**
6		Discuss segmentation in operating system with an example.	**[L2][CO6]**	**[10M]**
7		Illustrate the procedure for page fault in demand paging with neat diagram.	**[L3][CO6]**	**[10M]**
8	a)	Describe in detail about CoW technique	**[L2][CO6]**	**[5M]**
	b)	Consider the following reference string 7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1. Assume there are three frames. Apply LRU replacement algorithm to the reference sting above and find out how many page faults are produced. Illustrate the LRU page replacement algorithm in detail.	**[L3][CO6]**	**[5M]**
9		Given page reference string: 1,2,3,2,1,5,2,1,6,2,5,6,3,1,3,6,1,2,4,3. Compare the number of page faults for LRU, FIFO and Optimal page replacement algorithm.	**[L4][CO6]**	**[10M]**
10	a)	Discuss about frame allocation and the algorithms used to achieve it.	**[L2][CO6]**	**[5M]**
	b)	What is thrashing? Explain the causes of thrashing in detail.	**[L2][CO6]**	**[5M]**
11	a)	Describe Mass Storage Structure Devices.	**[L2][CO6]**	**[5M]**
	b)	Explain in detail about Disk management.	**[L2][CO6]**	**[5M]**
12		Illustrate the following disk scheduling algorithm with suitable example FCFS SSTF SCAN LOOK C-SCAN	**[L3][CO6]**	**[10M]**

Course Code: 23CS0511 **R23**

UNIT –V

FILE SYSTEM, FILE SYSTEM IMPLEMENTATION & PROTECTION

1	a)	List out the directory support operations on the file.	**[L1][CO2]**	**[2M]**
	b)	Give the different layers of file system.	**[L1][CO2]**	**[2M]**
	c)	List the reasons for local file system failures	**[L1][CO2]**	**[2M]**
	d)	Describe the goals of protection.	**[L1][CO2]**	**[2M]**
	e)	Analyze the Advantages and disadvantages of Protection Rings	**[L4][CO2]**	**[2M]**
2	a)	What is file? Explain its structure and attributes in detail.	**[L2][CO2]**	**[5M]**
	b)	Analyze the different file types available.	**[L4][CO2]**	**[5M]**
3		Explain about file access methods with Example.	**[L3][CO2]**	**[10M]**
4		Analyze the different types of directory implementations methodologies with neat diagram.	**[L4][CO2]**	**[10M]**
5	a)	List and explain the various types of file operations.	**[L2][CO2]**	**[5M]**
	b)	Describe different file allocation methods in detail.	**[L2][CO2]**	**[5M]**
6		Illustrate the different directory structures in operating system with its advantages and disadvantages.	**[L3][CO2]**	**[10M]**
7		Explain in detail how free space management is performed in operating system.	**[L2][CO2]**	**[10M]**
8		Describe file system mounting in operating systems with an example and how does it manage access to files across different storage devices and partitions?	**[L2][CO2]**	**[10M]**
9		Discuss how operating systems handle file sharing, protection, and consistency in multi-user and distributed environments, and what are the different semantics used to manage changes to shared files.	**[L2][CO2]**	**[10M]**
10	a)	What is meant by Threats? List and describe few.	**[L2][CO2]**	**[5M]**
	b)	Explain about the domain of Protection.	**[L2][CO2]**	**[5M]**
11		Explain the following i) Uses of Protection rings ii) Levels of Protection rings iii) Modes of Protection Ring	**[L2][CO2]**	**[10M]**
12	a)	Analyze the advantages and disadvantages of protection rings.	**[L4][CO2]**	**[5M]**
	b)	Describe Access matrix and explain its implementation with an example.	**[L2][CO2]**	**[5M]**

Prepared by Ch.Sivasankar,Assistant Professor