Course Code: 20CI0601 **R20**

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR (AUTONOMOUS)
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code: Principles of Operating Systems (20CI0601) **Course & Branch**: B.Tech – CSIT

Year & Sem: II- B.Tech & I-Sem **Regulation: R20**

UNIT –I

1	**a)**	Analyze the important services of an operating system?	**[L4][CO1]**	**[8M]**
	b)	Write a short note on system boot?	**[L1][CO1]**	**[4M]**
2	**a)**	What is operating system? Explain different types of operating system in detail?	**[L2][CO1]**	**[8M]**
	b)	List and discuss the different functions of an operating system?	**[L4][CO1]**	**[4M]**
3	**a)**	What is System Call? Explain different types of system calls?	**[L2][CO1]**	**[8M]**
	b)	Discuss about the functionality of system boot with respect to operating system?	**[L2][CO1]**	**[4M]**
4	**a)**	Difference between Kernel and Operating System.	**[L4][CO1]**	**[6M]**
	b)	Describe briefly the layers of operating system structures?	**[L1][CO1]**	**[6M]**
5	**a)**	Difference between Monolithic kernel and Micro kernel?	**[L4][CO1]**	**[6M]**
	b)	Explain the operating system structures?	**[L2][CO1]**	**[6M]**
6	**a)**	Discuss about User and Operating System Interface?	**[L2][CO1]**	**[6M]**
	b)	Write a short note on System programs.	**[L2][CO1]**	**[6M]**
7	**a)**	Discuss in briefly about Protection and Security?	**[L2][CO1]**	**[6M]**
	b)	Explain operating system operations?	**[L2][CO1]**	**[6M]**
8	**a)**	Explain in detail about open source operating systems?	**[L2][CO1]**	**[6M]**
	b)	Explain about evaluation of operating system?	**[L2][CO1]**	**[6M]**
9	**a)**	Explain: I) Real time system II) Distributed system III) Simple batch system	**[L2][CO1]**	**[8M]**
	b)	Explain how operating system services are provided by system calls?	**[L2][CO1]**	**[4M]**
10	**a)**	Distinguish between Multitasking and Multiprogramming?	**[L4][CO1]**	**[6M]**
	b)	Describe in detail about computing environments with neat diagram?	**[L1][CO1]**	**[6M]**

UNIT –II

1	**a)**	Discuss the different multithreading models along with their Issues?	**[L2][CO2]**	**[6M]**
	b)	Explain the different threading issues?	**[L2][CO2]**	**[6M]**
2	**a)**	Explain different types of CPU Scheduling algorithms with example?	**[L4][CO2]**	**[8M]**
	b)	Discuss about scheduling criteria?	**[L2][CO2]**	**[4M]**

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<table>
<tr><td>3</td><td>a)</td><td>Discuss about process concept in detail?</td><td>[L2][CO2]</td><td>[4M]</td></tr>
<tr><td></td><td>b)</td><td>Consider the following five processes, with the length of CPU burst time given below:
<table><tr><th>Process</th><th>Burst Time</th></tr><tr><td>P1</td><td>24</td></tr><tr><td>P2</td><td>3</td></tr><tr><td>P3</td><td>3</td></tr></table>i) Consider a Gantt chart illustrating the execution of these job using FCFS, CPU scheduling.
ii) Calculate the average waiting time and average turnaround time.</td><td>[L5][CO2]</td><td>[8M]</td></tr>
<tr><td>4</td><td>a)</td><td>Describe the Inter Process Communication in client-server systems?</td><td>[L1][CO2]</td><td>[6M]</td></tr>
<tr><td></td><td>b)</td><td>Explain Process Control Block with neat diagram.</td><td>[L2][CO2]</td><td>[6M]</td></tr>
<tr><td>5</td><td>a)</td><td>Consider the following five processes, with the length of CPU burst time given below:
<table><tr><th>Process</th><th>Burst Time</th><th>Priority</th></tr><tr><td>P1</td><td>8</td><td>4</td></tr><tr><td>P2</td><td>6</td><td>1</td></tr><tr><td>P3</td><td>1</td><td>2</td></tr><tr><td>P4</td><td>9</td><td>2</td></tr><tr><td>P5</td><td>3</td><td>3</td></tr></table>Consider a Gantt chart illustrating the execution of these job using FCFS, RR (quantum=1), non-preemptive priority& SJF CPU scheduling.</td><td>[L5][CO2]</td><td>[6M]</td></tr>
<tr><td></td><td>b)</td><td>Consider the following five processes, with the length of CPU burst time given below:
<table><tr><th>Process</th><th>Burst Time</th><th>Priority</th></tr><tr><td>P1</td><td>8</td><td>4</td></tr><tr><td>P2</td><td>6</td><td>1</td></tr><tr><td>P3</td><td>1</td><td>2</td></tr><tr><td>P4</td><td>9</td><td>2</td></tr><tr><td>P5</td><td>3</td><td>3</td></tr></table>Calculate the average waiting time and average turnaround time for each of the above Scheduling algorithm.</td><td>[L5][CO2]</td><td>[6M]</td></tr>
<tr><td>6</td><td>a)</td><td>Explain in detail about operations of process?</td><td>[L2][CO2]</td><td>[6M]</td></tr>
<tr><td></td><td>b)</td><td>What is CPU scheduling? Explain types of Scheduling and Scheduling Criteria in detail?</td><td>[L1][CO2]</td><td>[6M]</td></tr>
<tr><td>7</td><td>a)</td><td>Consider the following processes, with the length of CPU burst time given below:
<table><tr><th>Process</th><th>Burst Time</th><th>Priority</th></tr><tr><td>P1</td><td>6</td><td>3</td></tr><tr><td>P2</td><td>3</td><td>2</td></tr><tr><td>P3</td><td>9</td><td>4</td></tr><tr><td>P4</td><td>4</td><td>1</td></tr></table>Consider a Gantt chart illustrating the execution of this job using FCFS, non-preemptive priority& SJF CPU scheduling.</td><td>[L5][CO2]</td><td>[6M]</td></tr>
</table>

	b)	Consider the following processes, with the length of CPU burst time given below: **Process** / **Burst Time** / **Priority** P1 / 6 / 3 P2 / 3 / 2 P3 / 9 / 4 P4 / 4 / 1 Calculate the average waiting time and average turnaround time for each of the above Scheduling algorithm.	**[L5][CO2]**	**[6M]**
8	**a)**	What are Threads? Write about Types of Threads?	**[L1][CO2]**	**[6M]**
	b)	Discuss about Multilevel Queue Scheduling and First come First Serve with example?	**[L2][CO2]**	**[6M]**
9	**a)**	Discuss briefly about the Process scheduling?	**[L2][CO2]**	**[6M]**
	b)	Explain briefly about the threading libraries?	**[L2][CO2]**	**[6M]**
10	**a)**	Consider the following processes, with the length of CPU burst time given below: **Process** / **Burst Time** / **Priority** P1 / 10 / 3 P2 / 4 / 1 P3 / 2 / 5 P4 / 1 / 4 P5 / 5 / 2 Consider a Gantt chart illustrating the execution of these job using FCFS,SJF ,non preemptive priority& Round Robin(quantum=1), CPU scheduling.	**[L5][CO2]**	**[6M]**
	b)	Consider the following processes, with the length of CPU burst time given below: **Process** / **Burst Time** / **Priority** P1 / 10 / 3 P2 / 4 / 1 P3 / 2 / 5 P4 / 1 / 4 P5 / 5 / 2 Calculate the average waiting time and average turnaround time for each of the above Scheduling algorithm.	**[L5][CO2]**	**[6M]**

UNIT –III

1	**a)**	Explain in detail Classical problems of synchronization?	**[L2][CO3]**	**[8M]**
	b)	What is Dead lock? Explain the advantages of dead lock?	**[L1][CO3]**	**[4M]**
2	**a)**	Explain in detail about Deadlock Avoidance?	**[L2][CO3]**	**[6M]**
	b)	What are the Strategies for handling Deadlock?	**[L1][CO3]**	**[6M]**
3	**a)**	Discuss briefly about Deadlock Characterization.	**[L2][CO3]**	**[6M]**
	b)	Explain the methods for handling deadlocks.	**[L2][CO3]**	**[6M]**

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<table>
<tr><td>4</td><td>a)</td><td>Describe the banker’s algorithm?</td><td>[L1][CO3]</td><td>[4M]</td></tr>
<tr><td></td><td>b)</td><td>Consider the following snapshot of a system.
<table>
<tr><th rowspan="2">Process</th><th colspan="4">Allocation</th><th colspan="4">Max</th><th colspan="4">Available</th></tr>
<tr><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>
<tr><td>P0</td><td>0</td><td>0</td><td>1</td><td>2</td><td>0</td><td>0</td><td>1</td><td>2</td><td>1</td><td>5</td><td>2</td><td>0</td></tr>
<tr><td>P1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>7</td><td>5</td><td>0</td><td colspan="4"></td></tr>
<tr><td>P2</td><td>1</td><td>3</td><td>5</td><td>4</td><td>2</td><td>3</td><td>5</td><td>6</td><td colspan="4"></td></tr>
<tr><td>P3</td><td>0</td><td>6</td><td>3</td><td>2</td><td>0</td><td>6</td><td>5</td><td>2</td><td colspan="4"></td></tr>
<tr><td>P4</td><td>0</td><td>0</td><td>1</td><td>4</td><td>0</td><td>6</td><td>5</td><td>6</td><td colspan="4"></td></tr>
</table>
Answer the following questions using banker’s algorithm:
1) What is the content of the matrix used?
2) Is the system in a safe state?
If a request from process p1 arrives for (0, 4, 2, 0) can the request be granted immediately?</td><td>[L5][CO3]</td><td>[8M]</td></tr>
<tr><td>5</td><td>a)</td><td>Explain the solution for Dining-Philosophers Problem?</td><td>[L2][CO3]</td><td>[6M]</td></tr>
<tr><td></td><td>b)</td><td>What is Semaphores and types of semaphores?</td><td>[L1][CO3]</td><td>[6M]</td></tr>
<tr><td>6</td><td>a)</td><td>Explain the Deadlock Detection.</td><td>[L1][CO3]</td><td>[6M]</td></tr>
<tr><td></td><td>b)</td><td>Explain about the Recovery from deadlock.</td><td>[L1][CO3]</td><td>[6M]</td></tr>
<tr><td>7</td><td>a)</td><td>What is Process synchronization? Explain Critical-section problem with solution?</td><td>[L1][CO3]</td><td>[6M]</td></tr>
<tr><td></td><td>b)</td><td>Explain about Synchronization Hardware?</td><td>[L2][CO3]</td><td>[6M]</td></tr>
<tr><td>8</td><td>a)</td><td>Explain in detail about producer consumer problem?</td><td>[L2][CO3]</td><td>[6M]</td></tr>
<tr><td></td><td>b)</td><td>Write the properties and limitations of semaphores?</td><td>[L1][CO3]</td><td>[6M]</td></tr>
<tr><td>9</td><td>a)</td><td>Explain Dead lock detection with Example?</td><td>[L1][CO3]</td><td>[6M]</td></tr>
<tr><td></td><td>b)</td><td>Explain Peterson’s solution?</td><td>[L1][CO3]</td><td>[6M]</td></tr>
<tr><td>10</td><td>a)</td><td>Considering a system with five processes P_0 through P_4 and three resources of type A, B, C. Resource type A has 10 instances, B has 5 instances and type C has 7 instances. Suppose at time t_0 following snapshot of the system has been taken:
<table>
<tr><th rowspan="2">Process</th><th colspan="3">Allocation</th><th colspan="3">Max</th><th colspan="3">Available</th></tr>
<tr><th>A</th><th>B</th><th>C</th><th>A</th><th>B</th><th>C</th><th>A</th><th>B</th><th>C</th></tr>
<tr><td>P_0</td><td>0</td><td>1</td><td>0</td><td>7</td><td>5</td><td>3</td><td rowspan="5">3</td><td rowspan="5">3</td><td rowspan="5">2</td></tr>
<tr><td>P_1</td><td>2</td><td>0</td><td>0</td><td>3</td><td>2</td><td>2</td></tr>
<tr><td>P_2</td><td>3</td><td>0</td><td>2</td><td>9</td><td>0</td><td>2</td></tr>
<tr><td>P_3</td><td>2</td><td>1</td><td>1</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>P_4</td><td>0</td><td>0</td><td>2</td><td>4</td><td>3</td><td>3</td></tr>
</table>
i) What will be the content of the Need matrix?
ii) Is the system in a safe state? If Yes, then what is the safe sequence?
What will happen if process P_1 requests one additional instance of resource type A and two instances of resource type C?</td><td>[L5][CO3]</td><td>[8M]</td></tr>
<tr><td></td><td>b)</td><td>Discuss about monitors.</td><td>[L2][CO3]</td><td>[4M]</td></tr>
</table>

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UNIT –IV

1	**a)**	What is Page replacement? Explain page replacement algorithms with example?	**[L1][CO4]**	**[8M]**
	b)	Discuss logical versus physical address space.	**[L2][CO4]**	**[4M]**
2	**a)**	Write about Contiguous memory allocation?	**[L1][CO4]**	**[6M]**
	b)	Explain about demand paging?	**[L2][CO4]**	**[6M]**
3	**a)**	Difference between paging and segmentation?	**[L4][CO4]**	**[8M]**
	b)	Explain briefly about dynamic loading	**[L1][CO4]**	**[4M]**
4	**a)**	Explain any two page replacement algorithms?	**[L5][CO4]**	**[6M]**
	b)	Explain the concept of segmentation in detail?	**[L2][CO4]**	**[6M]**
5	**a)**	Consider the following page reference string:1,2,3,4,2,1,5,6,1,2,3,7,6,3,2,1,2,3,6.How many page faults would occur for the LRU,FIFO,LFU and Optimal page replacement algorithms, assuming two and five frames.	**[L1][CO4]**	**[8M]**
	b)	Explain briefly about dynamic linking.	**[L1][CO4]**	**[4M]**
6	**a)**	Explain Structure of page table?	**[L2][CO4]**	**[6M]**
	b)	Explain the concept of Thrashing?	**[L2][CO4]**	**[6M]**
7	**a)**	What is paging? Explain in detail about paging?	**[L2][CO4]**	**[8M]**
	b)	Explain the terms: **I)** First-fit **II)** Best-fit **III)** Worst fit	**[L2][CO4]**	**[6M]**
8	**a)**	What do you mean by paging? Discuss in detail about structure of page tables with appropriate examples.	**[L2][CO4]**	**[8M]**
	b)	Write a short note on Virtual Memory.	**[L1][CO4]**	**[4M]**
9	**a)**	What is fragmentation? Explain the types?	**[L1][CO4]**	**[4M]**
	b)	Consider the following page reference string:2,1,0,3,4,0,0,0,2,4,2,1,0,3,2.How many page faults would occur if the working set policy were used with a window size of 47.Show when each page fault would occur clearly.	**[L5][CO4]**	**[8M]**
10	**a)**	Discuss swapping memory management?	**[L5][CO4]**	**[4M]**
	b)	Difference between External fragmentation and Internal fragmentation? How to solve the fragmentation problem using paging?	**[L5][CO4]**	**[6M]**

UNIT –V

1	**a)**	What is File? Explain File concept in detail.	**[L2][CO5]**	**[6M]**
	b)	Explain free space management?	**[L2][CO5]**	**[6M]**
2	**a)**	Explain stable storage management?		
	b)	Explain about disk structure.	**[L1][CO5]**	**[6M]**
3	**a)**	Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous was at cylinder 125. The queue of pending requests, in FIFO order, is: 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130 Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk-scheduling algorithms? **i)** FCFS **ii)** SSTF **iii)** SCAN	**[L5][CO5]**	**[6M]**

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	b)	Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous was at cylinder 125. The queue of pending requests, in FIFO order, is: 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130 Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk-scheduling algorithms? **i)** LOOK **ii)** C-SCAN **iii)** C-LOOK.	**[L5][CO5]**	**[6M]**
4	**a)**	Write short notes on File attributes	**[L1][CO5]**	**[6M]**
	b)	Write short notes on File Operations	**[L1][CO5]**	**[6M]**
5	**a)**	Write short note on Disk attachment?	**[L1][CO5]**	**[6M]**
	b)	Write short notes on File sharing	**[L1][CO5]**	**[6M]**
6	**a)**	Compare the C-LOOK and C-SCAN disk scheduling algorithms.	**[L4][CO5]**	**[6M]**
	b)	Write an elaborate note on RAID.	**[L4][CO5]**	**[6M]**
7	**a)**	Explain File access methods in detail?	**[L2][CO5]**	**[6M]**
	b)	What is Directory? Explain Directory implementation?	**[L2][CO5]**	**[6M]**
8	**a)**	Consider a typical situation in a multiprogramming environment, in which the operating system maintains a queue of requests for each I/O device. Assume the disk has 200 tracks and that the disk request queue has random requests in it. The requested tracks are received in the following order: 55,58,39,18,90,160,150,38,184,27,129,110,186,147,41,10,64,120.Assume that the head disk is initially positioned over track 100 and is moving in the direction of decreasing track number. Perform the analysis for **FIFO, SSTF** and **SCAN.**	**[L5][CO5]**	**[6M]**
	b)	Consider a typical situation in a multiprogramming environment, in which the operating system maintains a queue of requests for each I/O device. Assume the disk has 200 tracks and that the disk request queue has random requests in it. The requested tracks are received in the following order: 55,58,39,18,90,160,150,38,184,27,129,110,186,147,41,10,64,120.Assume that the head disk is initially positioned over track 100 and is moving in the direction of decreasing track number. Perform the analysis for **C-SCAN, LOOK** and **C-LOOK**.	**[L5][CO5]**	**[6M]**
9	**a)**	Explain in detail about File system Allocation methods with neat diagram?	**[L3][CO5]**	**[6M]**
	b)	Explain the different disk scheduling algorithms with neat diagrams.	**[L2][CO5]**	**[6M]**
10	**a)**	Discuss about directory structures with examples.	**[L2][CO5]**	**[6M]**
	b)	Write the operations in a directory.	**[L1][CO5]**	**[6M]**

PREPARED BY: ***CH.SIVASANKAR, Asst. Professor, Dept of CSIT.***