KIIT DEEMED TO BE UNIVERSITY
Autumn End Semester Examination-2022

Roll No.	
Registration No.	
Name	
Date of Exam	

OPERATING SYSTEM (CS2002)
7th Semester B.Tech

SECTION-A
(Answer All Questions)

Time: 30 Minutes   Full Marks = 2 × 7 = 14 Marks

Question No	Question	Write the correct option here.
Q.No:1	Write five kinds of resources managed by a typical modern operating system. **Answer:**	
Q.No:2	What is the job of a low-level scheduler? **Answer:**	
Q.No:3	What is mutual exclusion in the context of the critical section problem? **Answer:**	

Q.No:4	Suppose that a disk drive has 5000 cylinders, numbered 0 to 7999. The drive is currently serving a request at cylinder 2150, and the previous request was at cylinder 1805. The queue of pending requests, in FIFO order, is: 2069, 1212, 2296, 2800, 544, 1618, 356, 1523, 4965, and 3681 Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests if FCFS is used? **Answer:**	
Q.No:5	Assuming a 1-KB page size, what is the page number and offset for 3085 (decimal) as an address reference? **Answer:**	
Q.No:6	Consider a logical address space of 256 pages with a 4-KB page size, mapped onto a physical memory of 64 frames. a. How many bits are required in the logical address? b. How many bits are required in the physical address? **Answer:**	
Q.No:7	What is a context switch? **Answer:**	

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SECTION-B
(Answer Any Three Questions.)

Time: 1 Hour and 30 Minutes   Full Marks = 12 × 3 = 36 Marks

Q.No:8   The arrival times and burst times of four processes are as follows:

Process Name	Arrival Time	Burst Time
P0	2	A
P1	1	2
P2	3	1
P3	B	3

Find the order of completion and the average waiting time if preemptive shortest job first scheduling (Shortest Remaining Job First - SRTF) is used.
A = (Roll Number % 7) + 1
B = (Roll Number % 8) + 1

Q.No:9   Servers can be designed to limit the number of open connections. For example, a server may wish to have only N socket connections at any point in time. As soon as N connections are made, the server will not accept another incoming connection until an existing connection is released. Explain how semaphores can be used by a server to limit the number of concurrent connections.

Q.No:10   Consider a system consisting of four resources of the same type that are shared by three processes, each of which needs at most two resources. Show that the system is deadlock free.

Q.No:11   Consider the following page reference string: 1, 2, 3, A, 2, 1, 5, B, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. How many page faults would occur for the following replacement algorithms, assuming one, two, three, and seven frames (solve for each number of available frames, once assuming only one frame is available, then assuming two frames are available, so on and so forth)? Remember that all frames are initially empty, so your first unique pages will cost one fault each.

    1. LRU replacement

    2. FIFO replacement

    3. Optimal replacement

A = (Roll Number % 7) + 1

B = (Roll Number % 8) + 1

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SECTION-A
(Answer All Questions)

Time: 30 Minutes   Full Marks = 2 × 7 = 14 Marks

Question No	Question	Write the correct option here.
Q.No:1	Mention two kinds of kernels. Mention one advantage of each. **Answer:**	
Q.No:2	What is the job of a medium-level scheduler? **Answer:**	
Q.No:3	What is progress in the context of the critical section problem? **Answer:**	

Q.No:4	Suppose that a disk drive has 5000 cylinders, numbered 0 to 7999. The drive is currently serving a request at cylinder 2150, and the previous request was at cylinder 1805. The queue of pending requests, in FIFO order, is: 2069, 1212, 2296, 2800, 544, 1618, 356, 1523, 4965, and 3681 Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests if SSTF is used? **Answer:**	
Q.No:5	Assuming a 1-KB page size, what is the page number and offset for 42095 (decimal) as an address reference? **Answer:**	
Q.No:6	Consider a logical address space of 256 pages with a8-KB page size, mapped onto a physical memory of 64 frames. a. How many bits are required in the logical address? b. How many bits are required in the physical address? **Answer:**	
Q.No:7	What is the purpose of a process control block? **Answer:**	

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SECTION-B
(Answer Any Three Questions.)

Time: 1 Hour and 30 Minutes   Full Marks = 12 × 3 = 36 Marks

Q.No:8   The arrival times, priority (lower number is higher priority), and burst times of four processes are as follows:

Process Name	Priority	Arrival Time	Burst Time
P0	A	0	5
P1	2	1	3
P2	1	2	2
P3	0	B	2

Find the order of completion and the average waiting time if preemptive priority scheduling is used.

A = (Roll Number % 7) + 1
B = (Roll Number % 8) + 1

Q.No:9   A file is to be shared among different processes, each of which has a unique number. The file can be accessed simultaneously by several processes, subject to the following constraint: the sum of all unique numbers associated with all the processes currently accessing the file must be less than n. Write a monitor to coordinate access to the file.

Q.No:10   Consider the following snapshot of a system:

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	2	0	0	1	4	2	1	2	X	Y	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				

Illustrate that the system is in a safe state by demonstrating an order in which the processes may complete.

If a request from process P1 arrives for (1, 1, 0, 0), can the request be granted immediately?

X = (Roll Number % 7) + 3
Y = (Roll Number % 8) + 3

Q.No:11 Consider the following page reference string: 1. A. 3. 4. 2. 1. 5. 6. 2. 1. 2. 3. B. 6. 3. 2. 1. 2. 3. 6. How many page faults would occur for the following replacement algorithms. assuming one. two. three. and seven frames (solve for each number of available frames. once assuming only one frame is available. then assuming two frames are available. so on and so forth)? Remember that all frames are initially empty. so your first unique pages will cost one fault each.

1. LRU replacement
2. FIFO replacement
3. Optimal replacement

A = (Roll Number % 7) + 1
B = (Roll Number % 8) + 1

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OPERATING SYSTEM (CS2002)
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SECTION-A
(Answer All Questions)

Time: 30 Minutes   Full Marks = 2 × 7 = 14 Marks

Question No	Question	Write the correct option here.
Q.No:1	What is a virtual machine? What are its advantages? **Answer:**	
Q.No:2	What is the job of a high-level scheduler? **Answer:**	
Q.No:3	What is bounded waiting in the context of the critical section problem? **Answer:**	

Q.No:4	Suppose that a disk drive has 5000 cylinders, numbered 0 to 7999. The drive is currently serving a request at cylinder 2150, and the previous request was at cylinder 1805. The queue of pending requests, in FIFO order, is: 2069, 1212, 2296, 2800, 544, 1618, 356, 1523, 4965, and 3681	
	Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests if SCAN is used?	
	Answer:	
Q.No:5	Assuming a 1-KB page size, what is the page number and offset for 215201 (decimal) as an address reference?	
	Answer:	
Q.No:6	Consider a logical address space of 512 pages with a 4-KB page size, mapped onto a physical memory of 64 frames. a. How many bits are required in the logical address? b. How many bits are required in the physical address?	
	Answer:	
Q.No:7	How are context switches and process control blocks used when a system call is made?	
	Answer:	

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SECTION-B
(Answer Any Three Questions.)

Time: 1 Hour and 30 Minutes   Full Marks = 12 × 3 = 36 Marks

Q.No:8   The arrival times, priority (lower number is higher priority), and burst times of four processes are as follows:

Process Name	Priority	Arrival Time	Burst Time
P0	3	0	5
P1	A	1	3
P2	1	2	B
P3	0	3	2

Find the order of completion and the average waiting time if preemptive priority scheduling is used.
A = (Roll Number % 7) + 1
B = (Roll Number % 8) + 1

Q.No:9   Describe how the test_and_setand compare_and_swapinstruction work as hardware locks.

Q.No:10   Consider the following snapshot of a system:

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	2	0	0	1	4	2	1	2	X	3	Y	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				

Illustrate that the system is in a safe state by demonstrating an order in which the processes may complete.

If a request from process P1 arrives for (1, 1, 0, 0), can the request be granted immediately?
X = (Roll Number % 5) + 3
Y = (Roll Number % 4) + 2

Q.No:11   Assume that a program has just referenced an address in virtual memory. Describe a scenario in which each of the following can occur. (If no such scenario can occur, explain why.)
1.   TLB miss with no page fault
2.   TLB miss and page fault
3.   TLB hit and no page fault
4.   TLB hit and page fault

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SECTION-A
(Answer All Questions)

Time: 30 Minutes   Full Marks = 2 × 7 = 14 Marks

Question No	Question	Write the correct option here.
Q.No:1	What do threads share? Why do they have their own set of registers and stack? **Answer:**	
Q.No:2	Why does a round-robin scheduler ensure better response time over a shortest job first scheduler? **Answer:**	
Q.No:3	Any solution to the critical-section problem must satisfy three conditions. What are they? **Answer:**	

Q.No:4	Suppose that a disk drive has 5000 cylinders, numbered 0 to 7999. The drive is currently serving a request at cylinder 2150, and the previous request was at cylinder 1805. The queue of pending requests, in FIFO order, is: 2069, 1212, 2296, 2800, 544, 1618, 356, 1523, 4965, and 3681 Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests if LOOK is used? **Answer:**	
Q.No:5	Assuming a 1-KB page size, what is the page number and offset for 650000 (decimal) as an address reference? **Answer:**	
Q.No:6	Consider a logical address space of 1024 pages with a 4-KB page size, mapped onto a physical memory of 64 frames. a. How many bits are required in the logical address? b. How many bits are required in the physical address? **Answer:**	
Q.No:7	What is the job of the dispatcher? How does it use process control blocks to perform context switches? **Answer:**	

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SECTION-B
(Answer Any Three Questions.)

Time: 1 Hour and 30 Minutes   Full Marks = 12 × 3 = 36 Marks

Q.No:8   The arrival times, priority (lower number is higher priority), and burst times of four processes are as follows:

Process Name	Priority	Arrival Time	Burst Time
P0	A	0	5
P1	2	1	3
P2	1	2	2
P3	0	B	2

Find the order of completion and the average waiting time if preemptive priority scheduling is used.
A = (Roll Number % 7) + 1
B = (Roll Number % 8) + 1

Q.No:9   A file is to be shared among different processes, each of which has a unique number. The file can be accessed simultaneously by several processes, subject to the following constraint: the sum of all unique numbers associated with all the processes currently accessing the file must be less than n. Write a monitor to coordinate access to the file.

Q.No:10   Consider the following snapshot of a system:

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	2	0	0	1	4	2	1	2	X	Y	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				

Illustrate that the system is in a safe state by demonstrating an order in which the processes may complete.

If a request from process P1 arrives for (1, 1, 0, 0), can the request be granted immediately?

X = (Roll Number % 7) + 3
Y = (Roll Number % 8) + 3

Q.No:11 Consider the following page reference string: 1. A. 3. 4. 2. 1. 5. 6. 2. 1. 2. 3. B. 6. 3. 2. 1. 2. 3. 6. How many page faults would occur for the following replacement algorithms. assuming one. two. three. and seven frames (solve for each number of available frames. once assuming only one frame is available. then assuming two frames are available. so on and so forth)? Remember that all frames are initially empty. so your first unique pages will cost one fault each.

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2. FIFO replacement
3. Optimal replacement

A = (Roll Number % 7) + 1
B = (Roll Number % 8) + 1

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