U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

April 2024 Semester End Main Examinations

Programme: B.E. **Semester: III**
Branch: Information Science and Engineering **Duration: 3 hrs.**
Course Code: 23IS3PCOPS **Max Marks: 100**
Course: Operating System

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Explain the User and System services provided by the Operating system with a neat diagram.	CO1		**10**
	b)	In the context of two friends intending to communicate via Skype, what type of computing environment would be utilized?	CO1		**06**
	c)	Apply the appropriate Kernel data structure for the following cases: i. For storing Username and password ii. For representing the allocations of the resources. iii. For storing the marks of 100 students in the main memory. iv. Files that are being printed by a printer.	CO2	PO1	**04**
		UNIT - II			
2	a)	Depict with a neat diagram the structure of a Process Control Block (PCB).	CO1		**04**
	b)	A google search engine produces expected search results which are consumed by the client web browser. Design the suitable solution in-order to run the producer and consumer process concurrently.	CO1		**06**
	c)	Calculate ATAT and AWT, using RR (TQ =2ms) and FCFS for the given set of processes. Also justify which among the two given CPU scheduling algorithms is better.	CO3	PO2	**10**

Process Id	Arrival time	Burst time
P1	0	4
P2	1	5
P3	2	2
P4	3	1
P5	4	6

<table>
<tr><td></td><td></td><td></td><td colspan="3">OR</td><td></td><td></td><td></td></tr>
<tr><td></td><td>3</td><td>a)</td><td>Depict with a neat diagram the various states of a process.</td><td>CO1</td><td></td><td>04</td></tr>
<tr><td></td><td></td><td>b)</td><td>Differentiate between Direct communication and Indirect communication of IPC in message passing.</td><td>CO1</td><td></td><td>06</td></tr>
<tr><td></td><td></td><td>c)</td><td>Calculate ATAT and AWT, using SJF (Non-Preemptive mode) and Priority scheduling(Non-preemptive mode) for the given set of processes. Priorities for P1, P2,P3,P4 and P5 are 2,3,1,5 and 4 respectively(Higher the number, lesser its priority). Also justify which among the two given CPU scheduling algorithm is better.
<table>
<tr><th>Process Id</th><th>Arrival time</th><th>Burst time</th></tr>
<tr><td>P1</td><td>5</td><td>5</td></tr>
<tr><td>P2</td><td>4</td><td>6</td></tr>
<tr><td>P3</td><td>3</td><td>7</td></tr>
<tr><td>P4</td><td>1</td><td>9</td></tr>
<tr><td>P5</td><td>2</td><td>2</td></tr>
</table></td><td>CO3</td><td>PO2</td><td>10</td></tr>
<tr><td></td><td></td><td></td><td colspan="3">UNIT - III</td><td></td><td></td><td></td></tr>
<tr><td></td><td>4</td><td>a)</td><td>How are mutex locks implemented to address the critical section problem?</td><td>CO2</td><td>PO1</td><td>06</td></tr>
<tr><td></td><td></td><td>b)</td><td>How can the Dining Philosophers problem be addressed through the utilization of semaphores? Provide the solution with an explanation.</td><td>CO2</td><td>PO1</td><td>08</td></tr>
<tr><td></td><td></td><td>c)</td><td>Assume that there are 4 resources A,B,C and D and 5 processes P0 to P4.
<table>
<tr><th></th><th>Allocation
A B C D</th><th>Max
A B C D</th><th>Available
A B C D</th></tr>
<tr><td>p0</td><td>2 0 0 1</td><td>4 2 1 2</td><td>3 3 2 1</td></tr>
<tr><td>p1</td><td>3 1 2 1</td><td>5 2 5 2</td><td></td></tr>
<tr><td>p2</td><td>2 1 0 3</td><td>2 3 1 6</td><td></td></tr>
<tr><td>P3</td><td>1 3 12</td><td>1 4 2 4</td><td></td></tr>
<tr><td>p4</td><td>1 4 3 2</td><td>3 6 6 5</td><td></td></tr>
</table>
Answer the following questions using Bankers algorithm:
I. What is the content of the Need matrix?
II. Is the system in safe state?</td><td>CO3</td><td>PO2</td><td>06</td></tr>
<tr><td></td><td></td><td></td><td colspan="3">UNIT - IV</td><td></td><td></td><td></td></tr>
<tr><td></td><td>5</td><td>a)</td><td>Illustrate with a neat diagram how two processes are swapped in and out from the Main memory.</td><td>CO2</td><td>PO1</td><td>05</td></tr>
<tr><td></td><td></td><td>b)</td><td>Elucidate with a diagram how the page tables are structured in memory using Hashed page table technique.</td><td>CO2</td><td>PO1</td><td>06</td></tr>
<tr><td></td><td></td><td>c)</td><td>Consider page reference string 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2,3 with 4 page frames. Find number of page faults.
(use FIFO, LRU and optimal page replacement algorithms)</td><td>CO3</td><td>PO2</td><td>09</td></tr>
<tr><td></td><td></td><td></td><td colspan="3">OR</td><td></td><td></td><td></td></tr>
</table>

	6	a)	Differentiate between Fixed size and Variable size memory allocation.	*CO1*		**05**
		b)	Copy-on-write is mainly used in sharing the virtual memory of operating system processes, in the implementation of the fork system call. Justify your answer with an example.	*CO2*	*PO1*	**06**
		c)	Consider page reference string 4,7,6,1,7,6,1,2,7,2 with 3 page frames. Find number of page faults. (use FIFO,LRU and optimal page replacement algorithms)	*CO3*	*PO2*	**09**
			UNIT - V			
	7	a)	Illustrate the organization of files in Single-level and Two-level directory structure with a neat diagram.	*CO3*	*PO2*	**06**
		b)	List the several forms of accidental and malicious security violations.	*CO3*	*PO2*	**04**
		c)	Suppose a disk drive has 200 cylinders, numbered 0 to 199.The drive is currently serving a request at cylinder 50 .The queue of pending requests, in FIFO order is: 82,170,43,140,24,16,190 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) SCAN iii) LOOK	*CO3*	*PO2*	**10**

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