U.S.N.										

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

Autonomous Institute Affiliated to VTU

September / October 2023 Semester End Main Examinations

Programme: B.E. **Semester: IV**
Branch: Computer Science & Engineering **Duration: 3 hrs.**
Course Code: 22CS4PCOPS **Max Marks: 100**
Course: Operating Systems

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 various states of a process with a diagram.	CO1	PO1	**6**
	b)	With a neat diagram of a transition from User Mode to Kernel Mode, describe and analyze, how with the Mode Bit, it is possible to distinguish between a task that is executed on behalf of the operating System and one that is executed on behalf of the User.	CO1	PO1	**7**
	c)	Write a C program illustrating the UNIX system calls for FORKING a separate process. Hence, analyze the process creation.	CO2	PO2	**7**
		UNIT - II			
2	a)	The benefits of multi-threaded programming can be broken down into four major categories. Which are they? Describe them in detail.	CO1	PO1	**6**
	b)	A different approach to CPU scheduling is the Shortest-Job-First (SJF) scheduling algorithm. This algorithm associates with each process the length of the process's next CPU burst. Consider the following four processes, with the length of CPU burst given in milliseconds:	CO3	PO3	**8**

Process	Arrival Time	Burst Time
P1	0	8
P2	1	4
P3	2	9
P4	3	5

If the processes arrive at the ready queue at the times shown, and need the indicated burst times, then Calculate the Average Waiting for

1. Pre-emptive SJF scheduling
2. Non-Pre-emptive SJF scheduling

		c)	How does multiple-processor scheduling work? Explain the various approaches to multi-processor scheduling.	*CO1*	*PO1*	**6**
			UNIT - III			
	3	a)	Implement Reader-Writer's algorithm (with semaphores).	*CO3*	*PO3*	**7**
		b)	Consider the following Multi-Instance Resource Allocation Graph, find if there exists a Deadlock? Show all the calculations to justify your answer.	*CO2*	*PO2*	**7**
		c)	Illustrate the necessary and sufficient conditions for deadlock.	*CO1*	*PO1*	**6**
			UNIT - IV			
	4	a)	Memory partitions of 100KB,500KB, 200KB, 300KB, 600KB (in order) are available. How would First - Fit, Best - Fit and Worst Fit algorithms place processes of 212KB, 417KB, 112KB and 426KB (in order). Which algorithm makes the most efficient use of memory?	*CO2*	*PO2*	**7**
		b)	Consider the main memory with three-page frames and the following sequence of page references: 5,4,3,2,1,4,3,5,4,3,2,1,5. Apply FIFO page replacement technique to compute the total number of page faults. Bring out the relation between the Page faults and page frames. Justify if the above relation holds good in all conditions or not with an illustration.	*CO2*	*PO2*	**7**
		c)	Describe the action taken by the operating system when a page fault occurs with a neat diagram	*CO1*	*PO1*	**6**
			OR			
	5	a)	With a neat diagram of hardware support for relocation and limit registers, describe the concept of memory mapping and protection.	*CO1*	*PO1*	**7**
		b)	What is the difference between external fragmentation and internal fragmentation and how to solve the fragmentation problem using paging?	*CO1*	*PO1*	**6**
		c)	What is thrashing and mention the techniques used to handle the thrashing?	*CO1*	*PO1*	**7**

Process No.	Allocated R1	Allocated R2	Allocated R3	Request R1	Request R2	Request R3
P0	1	0	1	0	1	1
P1	1	1	0	1	0	0
P2	0	1	0	0	0	1
P3	0	1	0	1	2	0

			UNIT - V			
	6	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 request was at cylinder 125. The queue of pending requests in FIFO order is 86,1470,913,1774,948,1509,1022,1750,130. Starting from current head position, what is the total distance (in cylinders) that the Disk arm moves to satisfy all a pending requests, for each of the following disk Scheduling algorithms? i) SSTF ii) SCAN iii) LOOK iv)C-SCAN	*CO3*	*PO3*	**8**
		b)	Alice can read and write to file x, can read file y, and can execute file z. Bob can read file x, can read and write to file y, and cannot access file z. a) Write a set of access control lists for this scenario. Which list is associated with which file? b) Write the access control matrix for the system described above. c) Write the list of subjects and the list of objects for this system d) Perform the operations copy rights and owner rights.	*CO2*	*PO2*	**6**
		c)	Explain layered file system with necessary diagram.	*CO1*	*PO1*	**6**
			OR			
	7	a)	Suppose you are designing a file system for a document management application. You have the option to choose between a linear list directory implementation and a hash directory implementation. In what scenario would you choose, i) Linear list directory implementation ii) Hash table directory implementation Justify your answer.	*CO2*	*PO2*	**7**
		b)	Present a real-world scenario illustrating how data is read from and written to the disk using read/write heads and tracks. Use a labelled diagram to demonstrate the arrangement of the components within the magnetic disk.	*CO1*	*PO1*	**7**
		c)	Describe any three disk scheduling methods and draw the graph for all 4 methods for the queue: 98, 183, 37, 122, 14, 124, 5,67. Note that the head starts at 53.	*CO3*	*PO3*	**6**

****