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

Autonomous Institute Affiliated to VTU

July 2024 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: Electronics and Communication Engineering **Duration: 3 hrs.**
Course Code: 22EC5PE1OS **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)	A time-sharing system uses a time slice of 10ms. Each process has a cyclic behavior pattern. In each cycle, it requires an average of 5 ms of CPU time to compute the result of a subrequest and an average of 15 ms to print it on the user's screen. A process receives a new subrequest 100ms second after it has finished printing results of the previous subrequest. The operating system can accommodate 5 processes in memory at any time; however, it has enough I/O devices for 20 processes. The swap-in and swap-out times of each process are *ts* ms each. Calculate the average throughput of the system over a 5-second period in each of the following cases: **a.** The operating system contains 5 processes. **b.** The operating system contains 10 processes and *ts* is 75 ms. **c.** The operating system contains 10 processes and *ts* is 25 ms.	*CO1*	*PO1*	**12**
	b)	A system has 3 active processes P1, P2, P3; having the following time characteristics. The time slice is 10ms. Processes | P1 | P2 | P3 CPU | 15ms | 18ms | 27ms I/O | 50ms | 70ms | 45ms Draw a timing chart of the operation and summarize the activities at every time slice showing the state of each process	*CO1*	*PO1*	**8**
		UNIT - II			
2	a)	Compare and contrast kernel-level threads and user-level threads.	*CO2*	*PO2*	**10**
	b)	Identify and analyze the process **termination** and process **suspended** in a process state transition	*CO2*	*PO2*	**10**

			UNIT - III			
	3	a)	Assume four processes waiting in the ready queue. Find the schedule based on the preemptive Shortest Time to Go (STG) algorithm and calculate the average and weighted average turnaround time. Process | P1 | P2 | P3 | P4 Admission time | 0 | 2 | 3 | 5 Execution time | 5 | 3 | 7 | 3	*CO2*	*PO2*	**10**
		b)	Analyze the performance of different scheduling algorithms used in operating systems, such as First-Come First-Served (FCFS), Shortest Job Next (SJN), Round Robin (RR), and Priority scheduling.	*CO2*	*PO2*	**10**
			(OR)			
	4	a)	Assume four processes waiting in the ready queue. Find the schedule based on non-preemptive HRN algorithm and calculate the average and weighted average turnaround time. Process | P1 | P2 | P3 | P4 Admission time | 0 | 1 | 4 | 2 Execution time | 5 | 3 | 10 | 4	*CO2*	*PO2*	**10**
		b)	Analyze a potential race condition that could occur in an airline reservation system when multiple users try to book the last available seat on a flight.	*CO2*	*PO2*	**10**
			UNIT - IV			
	5	a)	In a system having three processP1, P2, and P3 active with their page entries. If the logical address given by CPU for P2 is 3250, Analyze a scenario of page translation with a neat diagram	*CO2*	*PO2*	**10**
		b)	Classify the contiguous and non-contiguous memory allocations by using real time applications	*CO1*	*PO1*	**10**
			(OR)			
	6	a)	Consider a system generating 32-bit logical address and having 128MB of main memory. The page size is 4KB. If page 200 exists in page frame 50 and byte number 100 is to be traced. Analyze the logical and physical address using address translation mechanism	*CO2*	*PO2*	**10**
		b)	Apply your understanding of heap and virtual memory to design a memory management strategy for a complex software application. Consider factors such as memory fragmentation, memory leaks, and efficient memory allocation.	*CO1*	*PO1*	**10**
			UNIT - V			
	7	a)	Describe the layers of Input-Output control system.	*CO1*	*PO1*	**10**
		b)	Describe the process of file processing, including file creation, opening, reading, writing, and closing.	*CO1*	*PO1*	**10**

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