4SARDAR PATEL INSTITUTE OF TECHNOLOGY

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S.Y. B.Tech. BRANCH : COMP. ENGG., CSDS, AIML Sem: IV

SPECIAL EXAMINATION August 2023

CE206: Operating Systems

Max. Marks: 100 Time: 3 hours

Instructions

- Carefully read the question and the weight age given, and accordingly strategies your answers. *(Don't write things which are not asked)*
- Make suitable assumptions, if required. Mention those categorically.
- All Questions are Compulsory.
- New Question (not a sub-question) be solved from a new page.
- You may choose any sequence of questions while writing the answers, however, all sub questions must be written in a sequence.
- The last two columns are related to Outcome Based Education. (You don't bother)

Q. No		Questions	MM	BL	CO
Q.1	a	Give Schematic diagram of program execution and explain every component of the translator, loader and linker .	10	2	1
	b	What are the different features of the Real Time operating system? Give some examples of real time OS?	10	2	1
Q.2	a	Consider a multicore system and a multithreaded program written using the many-to-many threading model. Let the number of user-level threads in the program be greater than the number of processing cores in the system. Discuss the performance implications of the following scenarios. a. The number of kernel threads allocated to the program is less than the number of processing cores. b. The number of kernel threads allocated to the program is equal to the number of processing cores. c. The number of kernel threads allocated to the program is greater than the number of processing cores but less than the number of user-level threads.	10	3	2
	b	What is a fork? Why do we use a fork? Explain different values returned by fork.What is the output of the following code? Draw a diagram and explain it. #include <stdio.h>	10	3	2

		int main()
		{
		fork();
		printf("If the fork function is successful in creating a child process, I will print twice.\n");
		return 0;
		}			

Q3	a	What is a deadlock? What are preemptable and non preemptable resources with examples? List the conditions that lead to deadlock.	10	2	2
	b	What is race condition? What is the critical section? Explain any solution to the critical section problem must satisfy which requirements. What is the use of the Peterson solution? Is it applicable for how many processes?	10	2	3
Q4	a	Compare the Paging and segmentation.A system uses 3 page frames for storing process pages in main memory. It uses the First in First out (FIFO) page replacement policy. Assume that all the page frames are initially empty. What is the total number of page faults that will occur while processing the page reference string given below- 4 , 7, 6, 1, 7, 6, 1, 2, 7, 2 Also calculate the hit ratio and miss ratio. **OR** Why is virtual memory used? Explain demand paging with the help of example.	10	3	4
	b	Consider the set of 5 processes whose arrival time and burst time are given below-	10	3	2

		<table><tr><th>Process Id</th><th>Arrival time</th><th>Burst time</th></tr><tr><td>P1</td><td>3</td><td>1</td></tr><tr><td>P2</td><td>1</td><td>4</td></tr><tr><td>P3</td><td>4</td><td>2</td></tr><tr><td>P4</td><td>0</td><td>6</td></tr><tr><td>P5</td><td>2</td><td>3</td></tr></table> If the CPU scheduling policy is SJF preemptive, Calculate the average waiting time and average turn around time.			
Q5	a	Provide the examples of applications that typically access files according to the following methods 1. Sequential 2. Random	10	3	5
	b	Explain the FCFS and SSTF disk scheduling algorithm with an example.	10	3	5