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SCHOOL OF TECHNOLOGY MANAGEMENT & ENGINEERING

Academic Year: 2022-23

Programme: B. Tech (CSE Data Science)

Year: II

Semester: III

Subject: Operating Systems

Date: 30 November 2022

Marks: 100

Time: 10.00 am - 1.00 pm

Durations: 3 (Hrs)

No. of Pages: 03

Final Examination

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover of the Answer Book, which is provided for their use.

- 1) Question No. 1 is compulsory.
- 2) Out of remaining questions, attempt any 4 questions.
- 3) **In all 5 questions to be attempted.**
- 4) All questions carry equal marks.
- 5) **Answer to each new question to be started on a fresh page.**
- 6) **Figures in brackets on the right hand side indicate full marks.**
- 7) **Assume Suitable data if necessary.**

Q1		Answer briefly:	[20]												
CO- 1 ; SO-1,6 ; BL-2	a.	Compare Monolithic kernel and Micro kernel.	5												
CO- 2 ; SO- 1,6; BL-2	b.	Discuss different types of schedulers.	5												
CO- 3; SO-1,6 ; BL-2	c.	Discuss the effect of page size on performance of Operating system.	5												
CO- 4 ; SO-1,6 ; BL-1	d.	Explain any two UNIX system calls.	5												
Q2 CO-2; SO-6,1; BL-4	a.	Assume the following processes arrive for execution at the time indicated and the length of CPU burst time given in msec. <table><tr><th>Process</th><th>Arrival Time</th><th>Burst time</th></tr><tr><td>P1</td><td>2</td><td>6</td></tr><tr><td>P2</td><td>1</td><td>3</td></tr><tr><td>P3</td><td>4</td><td>2</td></tr></table>	Process	Arrival Time	Burst time	P1	2	6	P2	1	3	P3	4	2	[10]
Process	Arrival Time	Burst time													
P1	2	6													
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		<table><tr><td>P4</td><td>0</td><td>5</td></tr><tr><td>P5</td><td>6</td><td>4</td></tr></table> <p>For the above process parameter, Calculate average Turnaround time and average Waiting time for the following process scheduling algorithms.</p> <ol style="list-style-type: none">1. Shortest Remaining Time First (SRTF)2. Round Robbin (assume time quantum=3 units)	P4	0	5	P5	6	4	
P4	0	5							
P5	6	4							
Q2 CO-3; SO-1,6; BL-1	b.	Define Virtual Memory? Explain Demand paging with valid and invalid bit.	[10]						
Q3 CO- 1; SO-1,6; BL-1	a.	Explain System Calls with neat diagram? Enlist different types of System calls.	[10]						
Q3 CO- 3; SO-1,6; BL-1	b.	Define Paging? Calculate total number of page fault, page hit, hit ratio and miss ratio for the following string using LRU, FIFO and optimal page replacement policy. Consider the page frame size is 4. Give advantages and disadvantage of each algorithm. 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 3	[10]						
Q4 CO-3; SO-1,6; BL-4	a	Discuss different types of partitioning? Given memory partition of 100 KB, 500 KB, 200 KB, 450 KB and 600 KB in same order how would each of the first fit, best fit and worst fit algorithm places the processes of size 212 KB, 417 KB, 112 KB and 426 KB in same order. Evaluate, which algorithm makes most efficient use of memory?	[10]						
Q4 CO-2; SO-1,6; BL-2	b	Define Threads and its types? Discuss different Multithreading models?	[10]						
Q5 CO-3; SO-1,6; BL-4	a.	Define Seek time? Suppose that a disk drive has 200 cylinders, numbered 0 to 199. The drive is currently serving a request at cylinder 60. The queue of pending requests is in following order 70, 140, 50, 125, 30, 25, 160. What is the total distance that the disk arm moves for the following by applying	[10]						

		following algorithm? Also discuss the advantages and disadvantages of these algorithm 1. FCFS 2. SSTF 3. LOOK (Move towards higher direction)																																																																																												
Q5 CO-1; SO-1,6; BL-1	b.	Define Operating System? Discuss different services provided by Operating System with neat diagram.	[10]																																																																																											
Q6 CO-2; SO-1,6; BL-2	a.	Discuss how counting Semaphore can be used to solve readers writer problem.	[10]																																																																																											
Q6 CO-3; SO-1,6; BL-2	b.	Discuss Chained Allocation with neat diagram? Explain advantages and disadvantage and how it can be overcome.	[10]																																																																																											
Q7 CO-2; SO-1,6; BL-4	a.	Explain Bankers algorithm. Consider the following snapshot of the system. Using Bankers Algorithm calculate and clearly give the steps for i. Need Matrix ii. Is, the system in safe state? If Yes, give safe sequence. <table border="1"><thead><tr><th></th><th colspan="4">Allocation</th><th colspan="4">Max</th><th colspan="4">Available</th></tr><tr><th></th><th>A</th><th>B</th><th>C</th><th>D</th><th>A</th><th>B</th><th>C</th><th>D</th><th>A</th><th>B</th><th>C</th><th>D</th></tr></thead><tbody><tr><td>P0</td><td>3</td><td>0</td><td>1</td><td>4</td><td>5</td><td>1</td><td>1</td><td>7</td><td>0</td><td>3</td><td>0</td><td>1</td></tr><tr><td>P1</td><td>3</td><td>2</td><td>1</td><td>0</td><td>3</td><td>2</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td></tr><tr><td>P2</td><td>3</td><td>1</td><td>2</td><td>1</td><td>3</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td></td></tr><tr><td>P3</td><td>0</td><td>5</td><td>1</td><td>0</td><td>4</td><td>6</td><td>1</td><td>2</td><td></td><td></td><td></td><td></td></tr><tr><td>P4</td><td>4</td><td>2</td><td>1</td><td>2</td><td>6</td><td>3</td><td>2</td><td>5</td><td></td><td></td><td></td><td></td></tr></tbody></table>		Allocation				Max				Available					A	B	C	D	A	B	C	D	A	B	C	D	P0	3	0	1	4	5	1	1	7	0	3	0	1	P1	3	2	1	0	3	2	1	1					P2	3	1	2	1	3	3	2	1					P3	0	5	1	0	4	6	1	2					P4	4	2	1	2	6	3	2	5					[10]
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Q7 CO-4; SO-1,6; BL-1	b.	Write a short note on UNIX file system	[10]																																																																																											