U.S.N.										

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

Autonomous Institute Affiliated to VTU

December 2023 Supplementary 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.

			CO	PO	Marks
		UNIT - I			
1	a)	Explain the main advantages of parallel systems.	*CO1*	*PO1*	**5**
	b)	What are the operating system functions for ensuring the efficient operation of system?	*CO1*	*PO1*	**5**
	c)	Explain the different system utilities which provide convenient environment for program development & execution.	*CO1*	*PO1*	**10**
		UNIT - II			
2	a)	The following processes are scheduled using pre-Priority, RR algorithms. Each process is assigned a numerical priority with high number indicates high priority. In addition to the listed process system also has an idle task (which consumes no CPU resources & is identified as P-idle.)-This task has priority-0 & is scheduled whenever the system has no other available processes to run. The length of TQ=10units. If a process is preempted by a higher priority process, the preempted process is placed at the end of Q. (a) show the scheduling order of the processes using Gantt chart. (b) What is the TAT & WT for each process (c) What is the CPU UTILIZATION rate.	*CO2*	*PO2*	**10**

process	priority	Burst-Time	arrival
P1	40	20	0
P2	30	25	25
P3	30	25	30
P4	35	15	60
P5	5	10	100
P6	10	10	105

b) | CO3 | PO3 | **10**

process	Arr-Time	Burst-Time	Priority
P1	0	7	3
P2	3	2	2
P3	4	3	1
P4	4	1	1
P5	5	3	3

Lower priority indicates Highest priority

(a) Draw Gantt chart for SRTF, PREEMPTIVE-PRIORITY & RR (TQ=1)

(b) Compute the waiting time in each of 3 schedules in (a) & find which of them Provides results in minimal AVG waiting time & AVG Turnaround Time.

(c) Find out the time for which there are maximum number of processes in READY Q in the above scenario.

UNIT - III

3 a) Write the structure of Dining Philosopher and justify whether that structure generates the problems or not with the help of an example. If not, give the solution and provide the pair of philosophers that can eat independently. | CO1 | PO1 | **10**

b) Assume that there are 5 processes, P0 through P4, and 4 types of resources (A, B, C, D) and the maximum number of instances for the following resources are 3, 17, 16, 12 respectively. Following table shows the resource allocation state at the current instance: | CO2 | PO2 | **10**

Given Matrices

	Allocation Matrix (N0 of the allocated resources By a process)				Max Matrix Max resources that may be used by a process			
	A	**B**	**C**	**D**	**A**	**B**	**C**	**D**
P_0	0	1	1	0	0	2	1	0
P_1	1	2	3	1	1	6	5	2
P_2	1	3	6	5	2	3	6	6
P_3	0	6	3	2	0	6	5	2
P_4	0	0	1	4	0	6	5	6
Total	**2**	**12**	**14**	**12**				

i) Use the safety algorithm to test if the system is in a safe state or not?

ii) If the system is in a safe state, can the following requests be granted, why or why not? P1 requests (0,2,1,0)

UNIT - IV

4 a) Assume the amount of memory on a system is inversely proportional to the page fault rate. Each time memory doubles, the page fault rate is cut in half. Currently the system has 32mb of memory. When a page fault occurs, the average access time is 1ms, 1 microsecond otherwise. Overall, the effective access time | CO2 | PO2 | **5**

			is 330 microseconds. How much additional memory would be needed to cut the effective access time to 100 microseconds. Assume the total memory in the system must be power of 2.			
		b)	Given references to the following pages by a program, 0,9,0,1,8,1,8,7,8,7,1,2,8,2,7,8,2,3,8,3—how many page faults will occur if the program has three -page frames available to it and uses---FIFO, LRU, OPTIMAL page replacement Algorithms.	*CO3*	*PO3*	**10**
		c)	Given a memory partition 200k, 700k, 100k, 400k, apply first fit, best fit, worst fit to place 315k, 427k,250k,550k. Which algorithm makes the most efficient use of memory.	*CO2*	*PO2*	**5**
			OR			
	5	a)	On a system using simple segmentation, compute the physical address for each of the logical addresses. If the address generates segment fault, indicate so. Segment / Base / Length: 0 / 330 / 124 1 / 876 / 211 2 / 111 / 99 3 / 498 / 302 (i)0,99 (ii) 2,78 (iii) 1,265 (iv) 3,222 (v) 0,111	*CO3*	*PO2*	**10**
		b)	Given references to the following pages by a program,0,1,4,2,0,2,6,5,1,2,3,2,1,2,6,2,1,3,6,2—how many page faults will occur if the program has 3-page frames available to it and uses---FIFO, LRU, OPTIMAL page replacement Algorithms.	*CO1*	*PO1*	**10**
			UNIT - V			
	6	a)	On a disk with 1000 cylinders, numbered 0-999, compute the number of tracks the disk arm must move to satisfy all the requests in the disk q. Assume the last request serviced was at track 345 and the head is moving toward track 0. The q in FIFO order contains requests for the following tracks: 123, 874, 692, 475,105,376. Perform the computations for the following scheduling algorithms with diagram. –FIFO, SSTF, SCAN, LOOK, C-SCAN, C-LOOK.	*CO3*	*PO3*	**10**
		b)	Explain the different File-Allocation Methods.	*CO1*	*PO1*	**10**
			OR			
	7	a)	On a disk with 1000 cylinders, numbered 0-999, compute the number of tracks the disk arm must move to satisfy all the requests in the disk queue. Assume the last request serviced was at track 756 and the head is moving toward track 0. The queue in FIFO order contains requests for the following tracks: 811, 348, 153, 968, 407, 500. Perform the computations for the following	*CO3*	*PO3*	**10**

			scheduling algorithms with diagram. –FIFO, SSTF, SCAN, LOOK, C-SCAN, C-LOOK.			
		b)	Consider a file currently consisting of 100 blocks. Assume that the filecontrol block (and the index block, in the case of indexed allocation) is already in memory. Calculate how many disk I/O operations are required for contiguous, linked, and indexed (single-level) allocation strategies, if, for one block, the following conditions hold. In the contiguous-allocation case, assume that there is no room to grow at the beginning but there is room to grow at the end. Also assume that the block information to be added is stored in memory. a. The block is added at the beginning. b. The block is added in the middle. c. The block is added at the end. d. The block is removed from the beginning. e. The block is removed from the middle. f. The block is removed from the end.	*CO1*	*PO1*	**10**

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