SVKM'S NMIMS

MUKESH PATEL SCHOOL OF TECHNOLOGY MANAGEMENT& ENGINEERING/

SCHOOL OF TECHNOLOGY MANAGEMENT

Academic Year: 2023-2024

Program/s: MCA

Year: I Semester: I

Subject: Operating Systems

Time: 3 hrs (10am to 01 pm)

Date: 29 /11 / 2023

No. of Pages:3

Marks: 100

Final-Examination

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

1) Question No. _1___ is compulsory.
2) Out of the remaining questions, attempt any __4___ questions.
3) **In all ___5_ questions to be attempted.**
4) All questions carry equal marks.
5) **Answer 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:	
CO-1 ; SO-1,6; BL-4	a.	Differentiate the terms Tightly coupled vs. Loosely coupled systems.	5
CO-2; SO-1,6 ; BL-3	b.	Demonstrate the states followed in the process execution with a diagram.	5
CO- 3; SO-1; BL-2	c.	Explain the structure of Contiguous and Indexed File allocation methods.	5
CO-3; SO-1,6 ; BL-2	d.	Discuss various DMA types used for I/O data transfer.	5
Q2 CO-3; SO-1,6;BL-2 CO-3; SO-1,6; BL-3	a. b.	Explain how "Peterson's solution" supports ensuring the critical section. Illustrate the need for Page replacement in memory management. Find the Miss and hit ratio in LRU, OPTIMAL & FIFO page replacement algorithm for the reference string < 1,2,3,2,4,1,3,2,4,1 > for a main memory size of 3-page frames that are empty initially.	10 10
Q3 CO-2; SO-1,6; BL-1	a.	Define thread. Enlist various multithreading models. Explain each one of them with its advantages and disadvantages.	10

CO-3; SO-1,6; BL-4	b.	Differentiate between Concurrent, Cooperative, and Interleaving processes.	5
CO-3; SO-1,6; BL-2	c.	Discuss any three requirements of Memory management.	5
Q4 CO-3; SO-1,6; BL-3	a.	Illustrate the Paging hardware with the Translational Look ahead Buffer (TLB) mechanism. Lists the pros and cons of paging.	10
CO-2; SO-1,6; BL-2	b.	Describe the contents of the Process Control Block and its Uses.	5
CO-1; SO-1,6; BL-2	c.	Give a short note on Real-Time Operating Systems.	5
Q5 CO-3; SO-1; BL-4	a.	For a disk of 200 tracks, with an initial position at 63, pending requests are <47,38,121,191,87,11,92,10>. Calculate head movement for SSTF, SCAN, and CLOOK. If one adjacent track movement takes 0.5ms, what is the total time for the requests for individual algorithms? Compare their efficiency. (Assume head movement for SCAN is outwards and CLOOK is inwards). The cylinders are numbered from 0 to 199.	10
CO-2; SO-1,6; BL-2	b.	Explain how the semaphore is helping to solve the Readers Writers Problem	10
Q6 CO-2; SO-2; BL-4	a.	A uniprocessor system has three resource types, A, B, and C, which are shared by 3 processes (P0, P1, and P2), in which only 3 instances of A, 2 instances of B, and 2 instances of C are available at a particular instance. As per the following scenario, Will the system be Safe? What is the Process termination sequence order?	6

	Allocation			Max		
	A	B	C	A	B	C
P0	0	0	1	8	4	3
P1	3	2	0	6	2	0
P2	2	1	1	3	3	3

CO-2; SO-2; BL-2	b.	Identify the conditions required for the occurrence of deadlock.	4
CO-2; SO-1,6; BL-4	c.	Consider the following set of processes with the length of CPU burst time given in milliseconds. Draw the Gantt chart for SRTF, RR_2, and Pre-	10

		emptive Priority scheduling with 1 as high priority. Calculate average waiting and turnaround time. **Process** | **AT** | **BT** | **Priority** P1 | 0 | 5 | 2 P2 | 2 | 3 | 1 P3 | 4 | 3 | 3 P4 | 7 | 1 | 4	
Q7 CO-2,3; SO-1,6; BL-2 CO-3; SO-1,6; BL-3 CO-3; SO-1,6; BL-3	a. b. c.	Explain how the "Diner's Philosopher problem" is solved with an array of semaphores considering all 3 cases. Demonstrate the process of segmentation hardware in memory management. List its Pros and Cons. Describe two types of File Organization methods in detail.	10 5 5