

23/02/23 = 11:00 AM

SVKM'S NMIMS

**MUKESH PATEL SCHOOL OF TECHNOLOGY MANAGEMENT ENGINEERING /  
SCHOOL OF TECHNOLOGY MANAGEMENT ENGINEERING**

Program: MCA

Year: I

Semester : I

Academic Year: 2022-2023

Subject: Operating Systems

Date : 23 February 2023

Marks: 100  
Time: 01.00 am - 02.00 pm  
Duration: (Hrs)

No. of Pages: 02

**Re-Examination (2022-23)**

**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-2;SO-1,6 ; BL-2	a.	Draw and explain the Process state diagram with all stages of processes.	[5]																				
CO-2 ; SO-1,6 ; BL-2	b.	Explain the Critical Section and its requirements to ensure Concurrency.	[5]																				
CO-3; SO-1,6 ; BL-2	c.	Describe the three requirements of memory management.	[5]																				
CO-3 ; SO-1,6 ; BL-2	d.	Discuss the implementation of DMA and its types.	[5]																				
Q2 CO-3; SO-1,6; BL-3,4	a.	Differentiate Micro Kernel vs Layered architecture along with its advantages and disadvantages.	[10]																				
	b.	Consider the following set of processes with the length of the CPU burst time given in milliseconds <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>Process</th><th>AT</th><th>BT</th><th>Priority</th></tr> </thead> <tbody> <tr> <td>P1</td><td>0</td><td>7</td><td>4</td></tr> <tr> <td>P2</td><td>2</td><td>4</td><td>3</td></tr> <tr> <td>P3</td><td>4</td><td>2</td><td>1</td></tr> <tr> <td>P4</td><td>7</td><td>1</td><td>2</td></tr> </tbody> </table> Draw the Gantt chart for SRTF, RR-2, and Pre-emptive Priority Scheduling. Calculate the average waiting time and turnaround time. (1-high priority)	Process	AT	BT	Priority	P1	0	7	4	P2	2	4	3	P3	4	2	1	P4	7	1	2	[10]
Process	AT	BT	Priority																				
P1	0	7	4																				
P2	2	4	3																				
P3	4	2	1																				
P4	7	1	2																				

1/2

Q3 CO-2, SO-1,6, BL-2,3	a.	Identify the problem associated with bounded buffer and suggest the solution by using a suitable Semaphore.	[10]																																			
	b.1.	<p>A uniprocessor system has three resource types A, B, and C, which are shared by 3 processes (P0, P1, and P2), in which only 4 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 in a Safe state? What is the Process termination sequence order?</p> <table border="1"><thead><tr><th></th><th colspan="3">Allocation</th><th colspan="3">Max</th></tr><tr><th></th><th>A</th><th>B</th><th>C</th><th>A</th><th>B</th><th>C</th></tr></thead><tbody><tr><td>P0</td><td>0</td><td>1</td><td>0</td><td>8</td><td>3</td><td>4</td></tr><tr><td>P1</td><td>3</td><td>0</td><td>2</td><td>6</td><td>1</td><td>2</td></tr><tr><td>P2</td><td>1</td><td>2</td><td>2</td><td>3</td><td>3</td><td>3</td></tr></tbody></table>		Allocation			Max				A	B	C	A	B	C	P0	0	1	0	8	3	4	P1	3	0	2	6	1	2	P2	1	2	2	3	3	3	[06]
		Allocation			Max																																	
	A	B	C	A	B	C																																
P0	0	1	0	8	3	4																																
P1	3	0	2	6	1	2																																
P2	1	2	2	3	3	3																																
b.2.	Explain Deadlock prevention with respect to i) Hold and Wait ii) Circular wait		[2+2]																																			
Q4 CO3-; SO-1,6; BL-3	a.	RAM with 3 frames and the reference string 3,8,2,3,9,1,6,3,8,9,3,6,2,1,3 for FIFO, OPTIMAL, and LRU. Compare their efficiency	[10]																																			
	b.	For a disk of 200 tracks, with an initial position at 120 and pending requests are 30,70,115,130,110,80,20,25. Calculate head movement for SSTF, SCAN, and CLOOK. If one adjacent track movement takes 0.5ms, what is the total time taken for the whole requests for individual methods? Compare their Efficiency. (Assume initially the head movement for SCAN:-outwards and CLOOK:-inwards)	[10]																																			
Q5 CO-2; SO-1,6; BL-1,2	a.	What is the achievement of efficient Process Scheduling? Explain in detail Multilevel Queue and Multi-feedback Queue scheduling.	[10]																																			
	b.	Explain the following Hardware mutual Exclusion Techniques. a) Interrupt b) Test_and_Set	[5+5]																																			
Q6 CO-2,3; SO-1,6; BL-1,2	a.	Discuss all three cases of Deadlock existence in Diner Philosopher's problem and the solution for recovering from the same.	[10]																																			
	b.	What is Paging? Discuss Paging hardware with TLB in Memory management with the help of a diagram. List down the merits and demerits of the Paging Technique.	[10]																																			
Q7 CO-3; SO-1,6; BL-1,2,4	a.	Explain the various File Organization Techniques.	[10]																																			
	b.	What do you understand by Page referencing algorithm and Page Fault? Discuss the various steps to handle Page Faults as a part of Memory management.	[5]																																			
	c.	Differentiate Process vs Thread. Explain the benefits of Thread.	[5]																																			