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

Stream/s :

Subject: Operating Systems | Time: 3 hrs (10am to 1pm)

Date: 08 / 02/ 2024 | No. of Pages:3

Marks: 100

Re-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-2 ; SO-1,6 ; BL-4	a.	Differentiate between Multilevel queue vs Multilevel feedback queue scheduling.	5
CO-1; SO-1,6 ; BL-2	b.	Explain the Storage hierarchy in terms of size, speed and cost.	5
CO-3 ; SO-1,6 ; BL-2	c.	Discuss the "Test and Set" algorithm to facilitate the Critical section.	5
CO-3 ; SO-1,6 ;BL-3	d.	Illustrate the various techniques of address binding with the help of a diagram.	5
Q2 CO-2; SO-1,6; BL-2	a.	Identify the problem associated with the bounded buffer. How to solve this problem using semaphore. Elaborate with an example.	10
CO-2; SO-1,6; BL-4	b.	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	3
P2	2	3	1
P3	4	2	2
P4	6	1	4

Q3

CO-3; SO-1,6; BL-2

CO-3; SO-1,6; BL-4

CO-2; SO-2; BL-4

CO-2; SO-2; BL-2

a. Describe variable length spanned and unspanned blocking. 5

b Differentiate internal vs. external fragmentation in memory allocation by taking a suitable example. 5

c. A uniprocessor system has three resource types, X, Y, and Z, which are shared by 4 processes (P0, P1, P2, and P3), in which only 3 instances of X and 3 instances of Y 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		
	X	Y	Z	X	Y	Z
P0	1	0	1	4	3	1
P1	1	1	2	2	1	4
P2	1	0	3	1	3	3
P3	2	0	0	5	4	1

d. Explain various recovery methods from deadlock for graceful process termination. 4

Q4

CO-3; SO-1; BL-4

CO-3; SO-1,6; BL-4

a. For a disk of 100 tracks, with an initial position at 50, pending requests are <4,34,10,7,19,73,2,15,6,20>. Calculate head movement for SSTF, CSCAN, and LOOK. If one adjacent track movement takes 1 ms, what is the total time for the requests for individual algorithms? Compare their efficiency. (Assume head movement for CSCAN is outwards and LOOK is inwards). The cylinders are numbered from 0 to 99. 10

b. 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 < 2,3,4,2,1,5,3,2,4,6 > for a main memory size of 3-page frames that are empty initially. 10

Q5 CO-2,3; SO-1,6; BL-2 CO-2; SO-1,6; BL-3	a. b.	Explain how the "Diner's Philosopher problem" is solved with an array of semaphores considering all 3 cases. Demonstrate how the semaphore is helping to solve the Readers' Writers Problem.	10 10
Q6 CO-3; SO-1,6; BL-3 CO-3; SO-1,6; BL-2 CO-3; SO-1,6; BL-2	a. b. c.	Illustrate the Paging hardware with the Translational Look ahead Buffer (TLB) mechanism. Lists the pros and cons of paging. Explain the term I/O Buffering. Describe Block-oriented and stream-oriented single buffering methods. Explain the structure of Contiguous and Chained allocation methods.	10 5 5
Q7 CO-2; SO-1,6; BL-2 CO-1; SO-1,6; BL-2 CO-1; SO-1,6; BL-2	a. b. c.	Interpret Long-term, short-term, and medium scheduler. Discuss the importance of context switching in scheduling. Explain Micro kernel architecture and list 2 advantages and disadvantages. Give a short note on Distributed Operating Systems.	10 5 5