Paper id: 252369

Roll No: | | | | | | | | | | | | | |

MCA
(SEM II) THEORY EXAMINATION 2024-25
OPERATING SYSTEMS

TIME: 3 HRS **M.MARKS: 70**

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. Attempt *all* questions in brief. **02 x 7 = 14**

Q no.	Question	CO	Level
a.	Define operating system and its goals.	1	K2
b.	Differentiate between monolithic and micro kernel.	1	K2
c.	Discuss principle of concurrency.	2	K3
d.	Describe the solution to critical-section problem in brief.	2	K3
e.	Draw process state transaction diagram.	3	K2
f.	What are the characteristics of Deadlock?	4	K3
g.	What is fragmentation and its types?	5	K2

SECTION B

2. Attempt any *three* of the following: **07 x 3 = 21**

a.	Explain the layered structure of UNIX operating system with suitable diagram.	1	K2
b.	What is semaphore? Explain producer-consumer problem's solution with semaphore.	2	K3
c.	What is thread? Explain the actions taken by a thread library to context-switch between user level threads.	3	K3
d.	What do you mean by thrashing and its cause? Suggest solutions to overcome thrashing in virtual memory.	4	K3
e.	Discuss Contiguous memory allocation in details	5	K2

SECTION C

3. Attempt any *one* part of the following: **07 x 1 = 07**

a.	What are the various security issues that arise in multiprogramming and time-shared systems?	1	K2
b.	Explain Interrupt driven operation for operating system and also draw neat and clean diagram for steps of interrupt processing.	1	K5

4. Attempt any *one* part of the following: **07 x 1 = 07**

a.	What do you mean by algorithmic approach to critical section implementation? How Two-way solution works? How it is different from Dekker's solution and Peterson's solution.	2	K2
b.	Write and explain the solution for Sleeping-Barber classical synchronization problem using monitors.	2	K3

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5. Attempt any *one* part of the following: 07 x 1 = 07

a.	Consider the following scenario of processes with time quantum = 2. Draw the Gantt chart for the execution of the processes, showing their start time and end time, using improved round robin scheduling. Calculate turnaround time, normalized turnaround time and waiting time for each process and average turnaround time, average normalized turnaround time and average waiting time for the system. Compare all the metrics with round robin scheduling.	3	K5
b.	Explain Banker's Algorithm for Deadlock detection in details with Example?	3	K3

Process	P1	P2	P3	P4
Arrival Time	0	1	2	3
Execution Time	9	5	3	4

6. Attempt any *one* part of the following: 07 x 1 = 07

a.	In paging system with TLB, it takes 30 ns to search the TLB and 90 ns to access the memory. If the TLB hit ratio is 70% find the effective memory access time. What should be the hit ratio to achieve the effective memory access time of 130 ns.	4	K5
b.	Given page reference string: 1,2,3,2,1,5,2,1,6,2,5,6,3,1,3,6,1,2,4,3. Compare the number of page faults for LRU, FIFO and Optimal page replacement algorithm.	4	K5

7. Attempt any *one* part of the following: 07 x 1 = 07

a.	What is First-fit, Best-fit and Next-fit technique? Given five memory partitions of 100 KB, 500 KB, 200 KB, 300 KB, and600 KB (in order), how would each of the first-fit, best-fit, and worst-fit algorithms place processes of 212 KB, 417 KB, 112 KB, and 426 KB (in order)?Which algorithm makes the most efficient use of memory?	5	K5
b.	Consider a disk queue with I/O requests on the following cylinders in their arriving order: 6, 10, 12, 54, 97, 73, 128, 15, 44, 110, 34, 45 The disk head is assumed to be at cylinder 23 and moving in the direction of decreasing number of cylinders. The disk consists of total 150 cylinders. Calculate and show with diagram the disk head movement using LOOK and C-LOOK scheduling algorithm.	5	K5