CBCS SCHEME

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22MCA12

First Semester MCA Degree Examination, Dec.2023/Jan.2024
Operating System Concepts

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	What is an Operating System? Explain with a neat diagram the components of computer systems.	10	L2	CO1
	b.	Explain various services provided by the operating system.	10	L2	CO1
		OR			
Q.2	a.	Explain with the neat diagram the memory hierarchy.	10	L2	CO1
	b.	Explain different types of system program.	10	L2	CO1
		Module – 2			
Q.3	a.	Illustrate with a neat sketch, the process state and process control block.	10	L3	CO2
	b.	Discuss the various multithreading models. Also mention the benefits of multithreading.	10	L2	CO2
		OR			
Q.4	a.	Calculate the Average Waiting Time by drawing Gantt chart for i) Round robin method with the time quantum (q) = 2 ms.	10	L3	CO2

Process ID	Arrival Time (AT)	Burst Time (BT)
P1	0	5
P2	1	4
P3	2	2
P4	4	1

ii) Shortest Remaining Time First (SRTF) with preemptive mode

Process ID	Arrival Time (AT)	Burst Time (BT)
P1	0	5
P2	1	3
P3	2	4
P4	4	1

	b.	Explain the various operations of the processing with a neat diagram.	10	L2	CO2
		Module – 3			
Q.5	a.	Explain Dining Philosopher's problem, illustrate using semaphore, how to handle it.	10	L3	CO3
	b.	Considering the following example of a system, check whether the system is safe or not using Banker's Algorithm. Also determine the sequence of if it is safe.	10	L3	CO3

Process	Allocation			Max			Work Available		
	A	B	C	A	B	C	A	B	C
P_0	0	1	0	7	5	3	3	3	2
P_1	2	0	0	3	2	2			
P_2	3	0	2	9	0	2			
P_3	2	1	1	2	2	2			
P_4	0	0	2	4	3	3			

		OR			
Q.6	**a.**	What is deadlock? Explain the necessary conditions for the deadlock in detail.	**10**	**L2**	**CO3**
	b.	Illustrate with example Peterson's solution for critical section problem and prove that the mutual exclusion property is preserved.	**10**	**L4**	**CO3**
		Module – 4			
Q.7	**a.**	Consider the following page reference string 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2,3,7,6,3,2,1,2,3,6. How many page faults would occur, assuming three frames for FIFO, LRU and Optimal Page Replacement?	**10**	**L3**	**CO4**
	b.	Write short note on : i) Internal and external fragmentation ii) Dynamic loading and linking.	**10**	**L2**	**CO4**
		OR			
Q.8	**a.**	Explain contiguous memory allocation.	**10**	**L2**	**CO4**
	b.	Illustrate with a help of supporting diagram TLB improves the performance of demand paging.	**10**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	Explain the following terms briefly. i) File attributes ii) File type	**10**	**L2**	**CO5**
	b.	With a neat diagram illustrate the working of various file access methods.	**10**	**L3**	**CO5**
		OR			
Q.10	**a.**	Explain the following terms briefly. i) File operations ii) File system mounting	**10**	**L2**	**CO5**
	b.	Illustrate the various directory structures and discuss in detail.	**10**	**L3**	**CO5**

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