CBCS SCHEME

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BCS303

Third Semester B.E./B.Tech. Degree Supplementary Examination, June/July 2024

Operating Systems

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.	Define system call. List the types of system calls.	06	L1	CO1
	b.	With a neat figure, explain the concept of virtual machines.	06	L2	CO1
	c.	Define Operating System. Explain multiprogramming and time sharing operating system.	08	L2	CO1
		OR			
Q.2	a.	List the responsibilities of the operating system for process management and memory management.	06	L1	CO1
	b.	Different between kernel mode and user mode operation of operating systems.	06	L4	CO1
	c.	Discuss the services that are provided by the operating systems for users and its efficient operation.	08	L2	CO1
		Module – 2			
Q.3	a.	Explain the process states with a neat figure.	06	L2	CO2
	b.	Differentiate between the different types of multithreading models.	06	L4	CO2
	c.	Consider the following four processes, with the length of the CPU burst given in milliseconds: Process | Arrival Time | Burst Time P1 | 0 | 8 P2 | 1 | 4 P3 | 2 | 9 P4 | 3 | 5 Computer the average waiting for the above processes using FCFS, Preemptive SJF and non-preemptive SJF scheduling algorithms.	08	L3	CO2
		OR			
Q.4	a.	Define thread. List and explain the benefits of multithreaded programming.	06	L2	CO2
	b.	Differentiate between shared memory and message passing methods for interprocess communication.	06	L4	CO2
	c.	Consider the following set of processes, with the length of the CPU-burst time given in milliseconds: Process | Arrival Time | Burst Time P_1 | 10 | 3 P_2 | 1 | 1 P_3 | 2 | 3 P_4 | 1 | 4 P_5 | 5 | 2 The processes are assumed to have arrived in the under P_1 , P_2 , P_3 , P_4 , P_5 all at time 0. Compute the average waiting time for the above processes using FCFS, Priority (Smaller priority number implies higher priority) and RR (Time quantum = 1) scheduling algorithms.	08	L3	CO2

		Module – 3			
Q.5	**a.**	What is critical section problem? Discuss the three requirements that a solution to critical section problem must satisfy.	**06**	**L2**	**CO3**
	b.	Define semaphore. Explain how mutual exclusion can be implemented using semaphores.	**06**	**L2**	**CO3**
	c.	Consider a system with five processes P_0 through P_4 and three resource type A has ten instances, resource type B was five instances and resource type C has seven instances. Suppose at time 70, the following snapshot of the system has been taken. Determine whether the following system is safe using Banker's algorithm. Write the safe sequence. Allocation / Max / Available 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	**08**	**L3**	**CO3**
		OR			
Q.6	**a.**	What is deadlock? What are the necessary conditions for a deadlock to occur?	**06**	**L2**	**CO3**
	b.	Illustrate how dining philosophers' problem can be solved using semaphores.	**06**	**L2**	**CO3**
	c.	Give five memory partitions of 100 KB, 500 KB, 200 KB, 300 KB and 600 KB (in order). How would each of the first fit, best fit and worst-fit algorithms place processes of 212 KB, 417KB, 112 KB and 426 KB (in order)? Which algorithm makes the most efficient use of memory?	**08**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	Explain segmentation with an example.	**06**	**L2**	**CO4**
	b.	Describe the steps in handling a page fault with a neat figure.	**06**	**L2**	**CO4**
	c.	Consider the following reference string 7, 0, 1, 20, 3, 0, 42, 3, 03, 2,1, 2, 0, 1, 7, 0, 1 How many page faults would occur for the following replacement algorithms assuming three frames? (i) FIFO page replacement (ii) LRU page replacement	**08**	**L3**	**CO4**
		OR			
Q.8	**a.**	What is thrashing? How can it be controlled?	**06**	**L2**	**CO4**
	b.	Compare and contrast internal and external fragmentation of memory.	**06**	**L2**	**CO4**
	c.	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 for the following replacement algorithms assuming four frames. i) LRU replacement ii) Optimal replacement	**08**	**L3**	**CO4**

Module – 5					
Q.9	a.	Compare and contrast sequential access and direct access methods for extracting information from files.	06	L4	CO5
	b.	Describe the concept of protection domain with an example of a system with three protection domains.	06	L2	CO6
	c.	Suppose that a disk drive has 200 cylinders, numbered 0 to 199. The drive is currently serving a request at cylinder 53, and the previous request was at cylinder 20. The queue of pending requests in FIFO order is 98, 183, 37, 122, 14, 124, 65, 67 Starting from current head position, what is a total distance (in cylinders) that the disk arm move to satisfy all pending requests, for each of the following scheduling algorithms? i) SSTF ii) C-SCAN	08	L3	CO5
OR					
Q.10	a.	Differentiate between acyclic-graph directories and tree structured directories.	06	L4	CO5
	b.	Illustrate the concepts of access matrix with suitable examples.	06	L2	CO6
	c.	Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and suppose the previous request was at cylinder 125. The queue of pending requests in FIFO order is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Starting from current head position, what is the total distance (in cylinders) that the disk arm move to satisfy all the pending requests, for each of the following disk scheduling algorithms: i) FCFS ii) SCAN	08	L3	CO5

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