U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

August 2024 Semester End Main Examinations

Programme: B.E. **Semester: IV**
Branch: CSE(DS),CSE(ICB),AI&DS **Duration: 3 hrs.**
Course Code: 23DC4PCOPS **Max Marks: 100**
Course: Operating Systems

Instructions:1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	CO	PO	Marks
1	a)		With a neat diagram, discuss dual-mode operating system.	*CO1*	*PO1*	**06**
	b)		With suitable architecture, discuss the significant aspects and functionalities of microkernel structure and layered approach.	*CO1*	*PO1*	**08**
	c)		With suitable illustration of storage hierarchy, discuss the variety of storage systems organized in a hierarchy based on speed and cost.	*CO3*	*PO2*	**06**
			UNIT - II			
2	a)		Briefly explain the different types of multithreaded models.	*CO2*	*PO2*	**06**
	b)		Differentiate between binary semaphore and counting semaphore. Write pseudocode for wait and signal operation using structured variable	*CO3*	*PO3*	**06**
	c)		What is meant by critical section Problem? Give its general structure. Explain the requirements that must be satisfied by a solution to the critical section problem	*CO1*	*PO4*	**08**
			OR			
3	a)		Discuss Process control block. With a neat diagram explain the process and the various states of the process.	*CO1*	*PO2*	**07**
	b)		Give an algorithm for critical section problem involving at least two processes satisfying all necessary and sufficient conditions. Modify the same algorithm using semaphores.	*CO3*	*PO3*	**07**
	c)		Identify and discuss briefly the challenges in programming for multicore Systems.	*CO2*	*PO2*	**06**

B.M.S.C.E. EVEN SEM 2023-24

			UNIT - III			
	4	a)	Consider the set of 5 processes whose arrival time and burst time are given below table. Draw the Gantt chart and calculate the average waiting time and average turnaround time. i. Preemptive Shortest Job First scheduling ii. If the CPU scheduling policy is Round Robin with time quantum = 2 unit, **Process Id** / **Arrival time** / **Burst time** P1 / 0 / 5 P2 / 1 / 3 P3 / 2 / 1 P4 / 3 / 2 P5 / 4 / 3	*CO3*	*PO4*	**10**
		b)	Discuss the deadlock detection algorithms for both single and multiple instances of resources bringing out the salient aspects of both algorithms.	*CO2*	*PO2*	**10**
			OR			
	5	a)	i)You are a system administrator for a company with multiple networked printers. The company uses a custom print management system that handles print jobs from various departments. Each print job is a process that needs to acquire access to one or more printers, which are shared resources. Lately, you have noticed that the system occasionally gets stuck, with several print jobs waiting indefinitely because they are in a deadlock situation. Given the scenario of a print management system experiencing deadlocks due to multiple print jobs needing access to shared printers, what are some effective strategies for preventing deadlocks? ii) Consider following Edge E = {P1 → R1, P2 → R3, R1 → P2, R2 → P2, R2 → P1, R3 → P3} i) Draw Resource allocation graph and find sets of P& R ii) Examine whether graph has deadlock or not	*CO3*	*PO3*	**10**

B.M.S.C.E. EVEN SEM 2023-24

	b)	Consider the following snap-shot of a system. i). What is the content of matrix NEED? ii). Is the system in a safe state? If so, give the Safe sequence. iii). If a request from a process p1 arrives for (0 4 2 0) can the request be granted immediately?	*CO3*	*PO4*	**10**

process	allocation				Max				Available resources			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	2	6	3	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

		UNIT - IV			
6	a)	Given memory partitions of 100 KB, 500 KB, 200 KB, 300 KB, 600 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 of memory	*CO2*	*PO4*	**07**
	b)	Consider a logical address space of 8 pages of 1024 words each mapped onto a physical memory 32 frame. How many bits are there in logical and physical address.	*CO2*	*PO2*	**04**
	c)	What is a translation lookaside buffer? Describe simple paging system with a suitable diagram for paging hardware with TLB.	*CO1*	*PO1*	**09**
		UNIT - V			
7	a)	Illustrate virtualization concept. Describe the trap-and-emulate method employed by virtual machines to transfer control from virtual user mode to virtual kernel mode.	*CO2*	*PO2*	**08**
	b)	Distinguish between type-1, programming environment virtualization and paravirtualization implementations of virtual machines.	*CO2*	*PO1*	**06**
	c)	Discuss the building blocks required for efficient virtualization	*CO1*	*PO1*	**06**

BMSCE. - EVEN SEM 2023-24

****