VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)
CHENNAI

Continuous Assessment Test (CAT) – II - April 2024

Programme	:	B.Tech. (Computer Science and Engineering)	Semester	:	Winter 2023-24
Course Code & Course Title	:	BCSE303L & Operating Systems	Class Number	:	CH2023240501867 CH2023240501869 CH2023240502684 CH2023240502685 CH2023240502686 CH2023240502687 CH2023240503355 CH2023240501871
Faculty	:	PRADEEP K V, BHANU CHANDER BALUSA, PRADEEP K, KIRUTHIKA S, ANANDAN P, VALLIDEVI K, PRABHA B, SUDHARSON S	Slot	:	D1+TD1
Duration	:	90 Minutes	Max. Mark		50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
- Use statistical tables supplied from the exam cell as necessary
- Use graph sheets supplied from the exam cell as necessary
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks
1		Consider the following resource allocation graph Check to see if a deadlock exists using a Wait For Graph. If yes, list the processes and resources involved. Explain in detail the recovery process without killing any process. If no deadlock, make the case for why there isn't a deadlock. In either scenario, give a workable flow of steps to demonstrate deadlock free condition.	10
2		Consider a bus ticket reservation system where users are able to enquire bus details, book ticket and cancel ticket. In this scenario, fixed number of tickets is available for a bus, but many users trying to book the tickets. When one user is booking a ticket by filling the details and navigated to	10

		the payment process meaning that the other users need to wait for some time to know the available number of seats. Write an appropriate pseudo code for the given scenario using hardware and software synchronization constructs that can be initialized and accessed only by atomic operations.	
3		Write a program in C to create three processes A, B and C and the task of these individual processes are as follows: • Process A: reads the 'n' numbers from the keyboard and counts the number of even numbers in it. Then this count will send to the Process B. • Process B: reads the count from Process A and determines the factorial of that count. This factorial result will send to the process C. • Process C: reads the factorial value from process B and determines the read value is prime number or not.	10
4		A hospital's medical imaging department has 10 Magnetic Resonance Imaging (MRI) machines with variable size of memory for storing patient scan data. These machines' memory partitions are as follows (in order): 170GB, 420GB, 150GB, 490GB, 620GB, 400GB, 250GB, 450GB, 350GB, and 700GB. Assume that ten patients are receiving MRI scans with varying imaging requirements, each producing a specified amount of data that must be saved. These scans produced the following data volumes (in order): 212GB, 417GB, 112GB, 426GB, 350GB, 500GB, 275GB, 400GB, 600GB, and 200GB. Using different allocation algorithms, assign MRI machines to patients based on their projected scan data sizes. Determine and compare both internal and external fragmentation for each technique.	10
5	a.	Consider the below given reference string, subject to the order of processor execution 1, 2, 4, 5, 2, 1, 2, 4. Page 1 and Page 2 are already in the main memory, which has space for maximum three pages only. Page 1 arrived ahead of Page 2. How many page faults will occur during processor reference when the least amount of recent used page algorithm is used? And also compute both Hit Ratio and Miss Ratio for the same. (4 Marks)	10
	b.	A system has 4 page frames with no pages loaded to begin with. Consider the following scenario Case-1: System first accesses 200 distinct pages in sequential order and then access same 200 distinct pages in same order. Case-2: System first accesses 200 distinct pages in sequential order and then access same 200 distinct page in reverse order. Compute the page faults occur in these cases using various page replacement algorithms (atleast 3 algorithms) and comment on it. (6 marks)	

**********All the best ************