Vellore Institute of Technology

School of Information Technology and Engineering

Continuous Assessment Test – II, Fall Semester-2019-20

Programme Name & Branch: B. Tech. IT **Exam Duration:** 90 mins **Slot:** B2/TB2

Course Code: ITE 2002 **Course Title:** Operating Systems

Faculty Name: Dr. Harshita Patel **Maximum Marks:** 50

ANSWER ALL QUESTIONS

S.No.	Questions	Marks
1.	Race conditions are possible in many computer systems. Consider a banking system that maintains an account balance with two functions: deposit(amount) and withdraw(amount). These two functions are passed the amount that is to be deposited or withdrawn from the bank account balance. Assume that a husband and wife share a bank account.Concurrently, the husband calls the withdraw() function and the wife calls deposit(). Describe how a race condition is possible and what might be done to prevent the race condition from occurring.	10
2.	Discuss the tradeoff between fairness and throughput of operations in the readers–writers problem. Propose a method for solving the readers–writers problem without causing starvation.	10
3.	A proposed solution to the Dining Philosophers deadlock problem is as follows: **Philosopher(int i) {** **while(1) {** **think();** **// grab forks if we can** **lock.P()** **fork[i].P();** **fork[(i+1)%5].P();** **lock.V();** **eat();** **// put down forks** **lock.P();** **fork[i].V();** **fork[(i+1)%5].V();** **lock.V();** **}** There are five philosophers and five forks. All the lock and fork	10

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	semaphores are initialized to 1. a. Is the second lock.P/lock.V pair necessary? Why or why not? b. If the second lock.P/lock.V pair isn't necessary, are there any negativeconsequences to having it there?	
4.	A computer system uses the Banker's algorithm to deal with deadlock. It's current state is shown in the following table where P_0, P_1, P_2, P_3 are processes and A, B, C are resource types: Maximum / Allocated / Available Process: A B C | A B C | A B C P_0: 6 5 4 | 0 3 4 | 4 3 1 P_1: 3 4 2 | 2 1 2 P_2: 1 0 4 | 0 0 2 P_3: 3 2 5 | 1 2 1 Find a Safe Sequence.	10
5.	Consider a system with 80% hit ratio, 50 nano-seconds time to search the associative registers, 750 nano-seconds time to access memory. Find the time to access a page a. When the page number is in associative memory. b. When the time to access a page when not in associative memory. c. Find the effective memory access time.	3 3 4