



VIT[®]

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

Continuous Assessment Test 2 – October 2022

Programme	: M.Tech. Integrated (Business Analytics)	Semester	: Fall 2022-23
Course	: Operating Systems	Code	: SWE3001
		Class Nbrs	: CH2022231000986 CH2022231000988
Faculty	: Dr. L. Shyamala, Dr. S. Renuka Devi	Slot	: C1+TC1
Time	: 90 Minutes	Max. Marks	: 50

Answer All Questions

Q.No.	Sub. Sec.	Question Description	Marks																								
1		<p>In a hospital, token system is being followed to treat the patients based on the severity level of the patient. Least number indicates emergency in attending the patient. Assume that there are 5 patients A, B, C, D, E who arrived at every 1 minute gap (starts with 0) and waiting in a queue with token numbers 5, 1, 3, 4, 2 respectively. Also assume that the time required to attend the patients are 9, 2, 4, 1, 5 minutes respectively. Apply the following strategies to attend each of the patients.</p> <p>(a) Patients attended at intervals of 3 minutes in a repeated fashion. (4 marks)</p> <p>(b) Patients attended based on their token numbers (4 marks)</p> <p>Illustrate the scheduling using neat Gantt chart. Which strategy will yield the minimum average waiting time? Justify your answer. (2 marks)</p>	10																								
2		<p>Consider a University with the following five departments: CSE, ECE, EEE, Civil and Mech. There are a total of 10 projectors, 12 printers, and 8 scanners available in the University. Each department has its own requirement on the above mentioned resources which is dynamic over time based on the demand. But, the maximum number of resources that each department can utilize at any point in time is restricted by the overall administrator and it is given below.</p> <table border="1"><thead><tr><th>Dept.</th><th>Projectors</th><th>Printers</th><th>Scanners</th></tr></thead><tbody><tr><td>CSE</td><td>4</td><td>2</td><td>1</td></tr><tr><td>ECE</td><td>5</td><td>2</td><td>5</td></tr><tr><td>EEE</td><td>2</td><td>3</td><td>1</td></tr><tr><td>Civil</td><td>1</td><td>4</td><td>2</td></tr><tr><td>Mech.</td><td>3</td><td>6</td><td>6</td></tr></tbody></table> <p>At present, the CSE department is allocated with 2 projectors. ECE department is allocated with 3 projectors, 1 printer and 2 scanners. EEE department is allocated with 2 projectors and 1 printer. Civil department is allocated with 1 projector, 3 printers and 1 scanner, and the Mechanical department is allocated with 1 projector, 4 printers and 3 scanners.</p> <ol style="list-style-type: none">Illustrate that the current allocation is safe or not by demonstrating an order in which the departments may be served. (5 marks)If the Mech. department requests additional for 2 printers and 2 scanners, can the request be granted immediately? Justify your answer. (5 marks)If the CSE department requests additional for 1 printer and 1 scanner, will it be possible for the administrator to grant immediately? (5 marks)	Dept.	Projectors	Printers	Scanners	CSE	4	2	1	ECE	5	2	5	EEE	2	3	1	Civil	1	4	2	Mech.	3	6	6	15
Dept.	Projectors	Printers	Scanners																								
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3 In a company, a stock book is kept on a shelf which is commonly accessed between two persons P1 and P2 for stock management. At any time, only one person can take the book and enter the stock details for avoiding the inconsistent entries, but both can view at the same time to verify the stock. Write a code to eliminate conflict between P1 and P2 to use the stock book. Justify your code with proper explanation that the basic characteristics required are satisfied by the code. (pesudo-code -6, Justification-4) 10

4. a. A counting semaphore was initialized to 13. Then 8 P(wait) operations and 5 V(signal) operations were completed on this semaphore. Find the resulting value of semaphore and explain in detail how semaphore ensures synchronization? 5
- b. Suppose we want to synchronize two concurrent processes P1 and P2 using binary semaphores S and T. The code for the processes P1 and P2 is shown below. 5

P1	P2
<pre>while(1) { printf("0"); printf("0"); }</pre>	<pre>while(1) { printf("1"); printf("1"); }</pre>

Initialize the synchronization variables and insert wait() and signal() at the appropriate places in P1 and P2 so that it leads to an output string of '110011001100'.

5. "To make threads cheap and fast, they need to be implemented at _____ level". Identify the type of thread which can provide concurrency at cheaper cost. Justify your answer by discussing its advantages and disadvantages. 5

