REG.NO.: 22BIT0641

VIT
Vellore Institute of Technology

SCHOOL OF COMPUTER SCIENCE ENGINEERING AND INFORMATION SYSTEMS
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2024-2025

SLOT: A2+TA2

Programme Name & Branch	:	**B.Tech. IT**
Course Code and Course Name	:	**BITE303L- Operating Systems**
Faculty Name(s)	:	**Dr.M.Priya, Dr.P.J. Kumar, Dr. S.Meenatchi**
Class Number(s)	:	**3339, 3319, 3349**
Date of Examination	:	**13-10-2024**
Exam Duration	:	**90 minutes**

Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes (Type the CO statements covered in this question paper. Use the CO number as per the syllabus copy)
  CO2. Apply principles of process management, CPU scheduling, and deadlocks.
  CO3. Design the process synchronization and Inter-Process Communication.
  CO4. Develop memory management schemes.

Q. No	Question	M	CO	BL
1	Consider the following snapshot of a system and determine the following using Banker's algorithm:	10	2	3

Process	Max	Allocation	Available
	A, B, C, D	A, B, C, D	A, B, C, D
P0	8 1 2 3	4 0 1 2	5 4 2 2 4 1 1 1
P1	5 8 6 1	3 2 1 1	2 6 5 0
P2	3 3 4 6	1 2 3 3	2 1 1 3
P3	2 5 4 3	0 5 3 3	2 0 1 0
P4	2 5 5 4	1 3 1 1	1 2 4 3

a. How many resources of A, B, C, and D are there? [1]
b. What are the contents of a need matrix? [2]
c. Find if the system is in a safe state. If it is, find the safe sequence. [4]

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	If a request from process P2 arrives for (1,0,1,0), can the request be granted immediately? If yes, show the possible order of execution (Safe Sequence). [3]			
2	Given six memory partitions of 350 KB, 550 KB, 400 KB, 250 KB, 850 KB, and 175 KB (in order), how would the first-fit, best-fit, and worst-fit algorithms place processes of size 200 KB, 625 KB, 348 KB, 475 KB, and 150 KB (in order)? Rank the algorithms in terms of how efficiently they use memory. Illustrate with a neat diagram.	10	4	3
3	Consider the following solution for the critical-section problem. There are two *P0* and P1. The variables shared by the P1 and P2 processes are as follows: **boolean flag[2]; /* initially false */** **int turn;** **Structure of process *P0* and P1** do { flag[i] = true; while (flag[j]) { if (turn == j) { flag[i] = false; while (turn == j) ; /* do nothing */ flag[i] = true; } } /* critical section */ turn = j; flag[i] = false; /* remainder section */ } while (true); Prove that the algorithm satisfies all three requirements for the critical-section problem.	10	3	4
4	Consider a monitor implemented with await (P) instead of two atomic operations namely wait () and signal (). The variable P is a Boolean expression which makes the current execution of the process wait till P becomes true. Using this scenario answer the following: i. Implement the dining philosopher's problem. ii. Which operation could produce a better result await (P) or wait() and signal(). Explain the reason with proper justification. iii. How could you improve the efficiency of such an operation?	10	3	4
5	Consider the following page reference string. **1,4,7,6,2,6,3,1,0,0,4,3,2,10,1,8** Find out the number of page faults, hit and miss ratios for the FIFO, Optimal, and LRU replacement algorithms assuming four frames and five frames. identify which algorithm generates high page faults. Remember that all frames are initially empty.	10	4	3

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