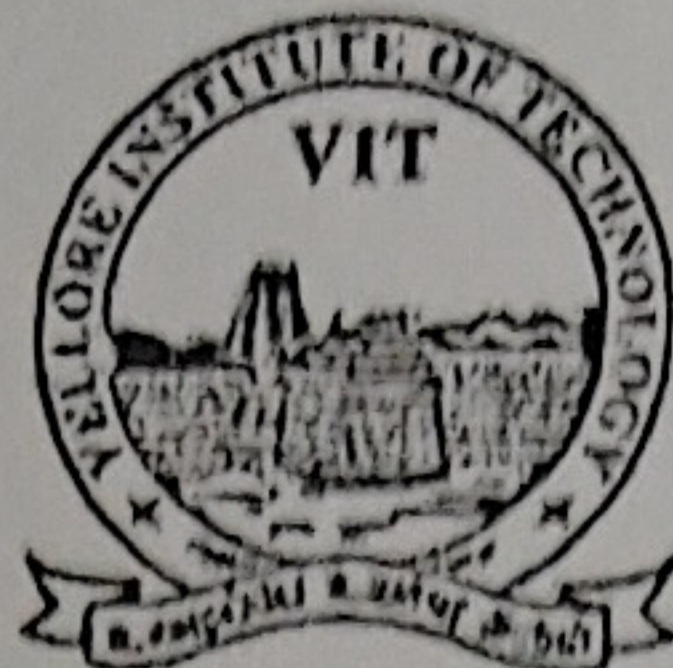


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VIT

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

SLOT: A2+TA2

SCHOOL OF ELECTRICAL ENGINEERING
FALL SEMESTER 2026-2027
CONTINUOUS ASSESSMENT TEST - II

Programme Name & Branch : B.Tech. & BEL
 Course Code and Course Name : BCSE303L and Operating Systems
 Faculty Name(s) : Dr. S. Thiruvankadam
 Class Number(s) : VL2026270101132
 Date of Examination : 27/09/2026
 Exam Duration : 90 minutes

Maximum Marks: 50

General instruction(s):

- Answer All Questions
- Rough work should not be done on question paper. It will be treated as malpractice.
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)

Course Outcomes Statements:

CO. 3: Apply and analyze communication between inter process and synchronization techniques.

CO. 4: Implement page replacement algorithms, memory management problems and segmentation.

Q.No	Question	M	CO	BL																		
1.	Consider a system with 5 processes P_0-P_4 and 3 resource types A, B, C. <table><tr><th>Process</th><th>Allocation</th><th>Maximum</th></tr><tr><td>P_0</td><td>1 0 1</td><td>3 2 2</td></tr><tr><td>P_1</td><td>2 1 0</td><td>4 2 1</td></tr><tr><td>P_2</td><td>1 2 1</td><td>2 3 3</td></tr><tr><td>P_3</td><td>0 1 2</td><td>2 2 3</td></tr><tr><td>P_4</td><td>1 0 0</td><td>3 1 2</td></tr></table> Total resources : (10, 7, 9) Answer the following: a) Calculate the Available vector. (2 M) b) Calculate the Need matrix. (2 M) c) Apply the Banker's Safety Algorithm. (3 M) d) Determine one safe sequence. (2 M) e) Determine whether more than one safe sequence is possible. (1 M)	Process	Allocation	Maximum	P_0	1 0 1	3 2 2	P_1	2 1 0	4 2 1	P_2	1 2 1	2 3 3	P_3	0 1 2	2 2 3	P_4	1 0 0	3 1 2	10	3	4
Process	Allocation	Maximum																				
P_0	1 0 1	3 2 2																				
P_1	2 1 0	4 2 1																				
P_2	1 2 1	2 3 3																				
P_3	0 1 2	2 2 3																				
P_4	1 0 0	3 1 2																				
2.	Four processes P_0, P_1, P_2, P_3 obtain the following Bakery algorithm ticket numbers: $P_0 = 5, P_1 = 2, P_2 = 2, P_3 = 7$ Determine the order in which the processes enter the critical section. Explain how the algorithm resolves the tie between P_1 and P_2. Also explain how the Bakery algorithm ensures bounded waiting.	10	3	4																		

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3.	Explain the Dining Philosophers problem in Operating Systems. Describe the problem, the conditions for deadlock, and the semaphore-based solution. Discuss the methods used to prevent deadlock and starvation.	10	3	2
4.	It is given that the Initial free memory holes are, 100 KB, 500 KB, 200 KB, 300 KB, 600 KB, 250 KB And also it is assumed that the Processes arrive in the following order: P1 = 212 KB, P2 = 417 KB, P3 = 112 KB, P4 = 426 KB, P5 = 250 KB, P6 = 350 KB Answer the following: a) Allocate all processes using First Fit, Best Fit and Worst Fit. (6 M) b) Show the remaining holes after every allocation. (1 M) c) Identify which processes cannot be allocated. (1 M) d) Calculate the total free memory after all allocations. (1 M) e) Justify why a process may fail even when sufficient total free memory exists. (1 M)	10	4	4
5.	A process generates the following reference string: 3, 2, 1, 4, 2, 5, 2, 1, 6, 3, 4, 2, 5, 1, 2, 6, 4, 3, 2, 1, 5, 4, 2, 3 Number of frames = 3 Determine (each answer carries two marks): a) FIFO page faults b) LRU page faults c) Optimal page faults d) Hit ratio and Fault ratio for each algorithm e) Number of replacements for each algorithm	10	4	3