VIT
Vellore Institute of Technology

SCHOOL OF COMPUTER SCIENCE ENGINEERING AND INFORMATION SYSTEMS
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

SLOT: E2+TE2

Programme Name & Branch	**: B.Tech. Information Technology**
Course Code and Course Name	**: BITE303L & Operating Systems**
Faculty Name(s)	**: VIVEKANANDA GN, MEENATCHI S, HARSHITA PATEL**
Class Number(s)	**: VL2025260103229, VL2025260103236, VL2025260103240**
Date of Examination	**: 09-Oct-2025**
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
  - CO2. Apply principles of process management, CPU scheduling and deadlocks.
  - CO3. Design the process synchronization and Inter Process Communication.
  - CO4. Develop memory management schemes.

<table>
<tr><th>Q. No</th><th>Question</th><th>M</th><th>CO</th><th>BL</th></tr>
<tr><td>1.</td><td>Resource Types: A(14), B(9), C(9)
Consider the following snapshot.
<table>
<tr><th>Process</th><th colspan="3">Allocation
A B C</th><th colspan="3">Max
A B C</th><th colspan="3">Available
A B C</th></tr>
<tr><td>P1</td><td>3</td><td>1</td><td>2</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td><td>1</td></tr>
<tr><td>P2</td><td>1</td><td>3</td><td>2</td><td>5</td><td>7</td><td>8</td><td colspan="3" rowspan="4"></td></tr>
<tr><td>P3</td><td>2</td><td>0</td><td>2</td><td>3</td><td>2</td><td>3</td></tr>
<tr><td>P4</td><td>2</td><td>1</td><td>1</td><td>5</td><td>3</td><td>3</td></tr>
<tr><td>P5</td><td>4</td><td>3</td><td>1</td><td>4</td><td>5</td><td>3</td></tr>
</table>
a) Calculate the need matrix
b) Find whether the system is in safe state or not. If safe, generate the safe sequence.
c) If P2 request for (2, 1,1), is it a valid request? can it be granted immediately? Provide the safe sequence if it can be granted.</td><td>10</td><td>2</td><td>2</td></tr>
<tr><td>2.</td><td>Two concurrent processes in a ticket booking system are responsible for allocating seats to users. Both processes access the same seat allocation table in memory. If both processes attempt to allocate a seat at the same time without proper coordination, the same seat may get assigned to two different customers, causing inconsistency and errors in the system. As the system designer, you are asked to identify the possible outcomes for</td><td>10</td><td>3</td><td>4</td></tr>
</table>

	the given scenario such as inconsistent results. Also apply the various approaches to handle the situation such as Peterson's solution.			
3.	A university's e-learning portal stores course materials such as lecture notes, assignments, and quizzes. Thousands of students log in daily to view or download the materials, while professors and administrators periodically update or replace the same files. Sometimes, many students may be accessing a file at once, while occasionally a professor might attempt to modify that file during the same time window. If these simultaneous operations are not carefully managed, it could result in inconsistent versions of files or even loss of updates. Suggest how semaphores can be applied to regulate simultaneous access, clearly distinguishing between different types of semaphores that may be useful. Also, propose a synchronization strategy that ensures fairness and correctness, balancing frequent access by students and occasional updates by professors.	10	3	4
4.	A computer has 2625 KB of main memory divided into partitions of sizes 350 KB, 650 KB, 400 KB, 250 KB, 750 KB, 225 KB. The jobs arrive (no job finishes during this interval) in the following order: J1 requiring 200 KB arrives J2 requiring 425 KB arrives J3 requiring 545 KB arrives J4 requiring 275 KB arrives J5 requiring 660 KB arrives Draw the memory allocation table using First Fit, Best Fit, and Worst Fit, and calculate the total externally fragmented memory after these arrivals for each scheme.	10	4	2
5.	For the given page reference string for a process, calculate the number of page faults for LRU, OPR and FIFO page replacement algorithm with number of frames as 3. Which technique gives the best Hit ratio. 1 0 2 0 1 1 3 1 3 0 1 2 1 2 0 1 3 2	10	4	4

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