NEP - Semester End Examination – October 2025

Program: SY.B.Sc.IT SEM-III **Course:** Operating System

Program Code: UGIT01 **Course Code:** NUIT303

Duration: 1 Hour **Max. Marks:** 30

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Draw neat diagrams wherever necessary.

<table>
<tr><td>Q. 1</td><td></td><td>Attempt any THREE of the following. (5 Marks each)</td><td>[15]</td><td>Course Outcome</td><td>Knowledge Level</td></tr>
<tr><td></td><td>(a)</td><td>Define a thread. What are the different types of threads?</td><td></td><td>CO2</td><td>L1</td></tr>
<tr><td></td><td>(b)</td><td>Explain how semaphores are used to implement mutual exclusion and synchronization.</td><td></td><td>CO2</td><td>L2</td></tr>
<tr><td></td><td>(c)</td><td>Critically assess the role of security/privacy management in OS design.</td><td></td><td>CO6</td><td>L5</td></tr>
<tr><td></td><td>(d)</td><td>Using the provided process table (P1-.P5 with arrival and burst times), compute completion times, turnaround times, waiting times, response times, and averages using First-Come-First-Served (FCFS) scheduling algorithm.
<table>
<tr><th>Process</th><th>Arrival Time</th><th>Burst Time</th></tr>
<tr><td>P1</td><td>0</td><td>5</td></tr>
<tr><td>P2</td><td>2</td><td>3</td></tr>
<tr><td>P3</td><td>1</td><td>8</td></tr>
<tr><td>P4</td><td>4</td><td>6</td></tr>
<tr><td>P5</td><td>3</td><td>2</td></tr>
</table></td><td></td><td>CO2</td><td>L3</td></tr>
<tr><td></td><td>(f)</td><td>Suggest improvements to traditional batch processing systems using modern OS techniques.</td><td></td><td>CO2</td><td>L6</td></tr>
<tr><td></td><td>(g)</td><td>Debate whether Linux or Windows provides a better OS environment for developers.</td><td></td><td>CO1</td><td>L5</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Q. 2</td><td></td><td>Attempt any THREE of the following. (5 Marks each)</td><td>[15]</td><td>Course Outcome</td><td>Knowledge Level</td></tr>
<tr><td></td><td>(a)</td><td>Explain the conditions that lead to thrashing and its effect on system performance.</td><td></td><td>CO4</td><td>L2</td></tr>
</table>

	(b)	Design a memory hierarchy diagram for a modern computer system.		CO1	L5
	(c)	Evaluate the effectiveness of First in First Out page replacement algorithm using the following page reference string: 2, 3, 2, 1, 5, 2, 4, 5, 3, 2, 5, 2, assuming 3 page frames. Justify which algorithm performs better based on the number of page faults.		CO3	L5
	(d)	Show a real-life analogy of two-level directory structure.		CO3	L3
	(e)	List and explain allocation methods (Linked list allocation & indexed allocation)		CO1	L1
	(g)	Analyze how file attributes impact various file operations in an operating system. Provide examples to illustrate the relationship between them.		CO5	L4

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