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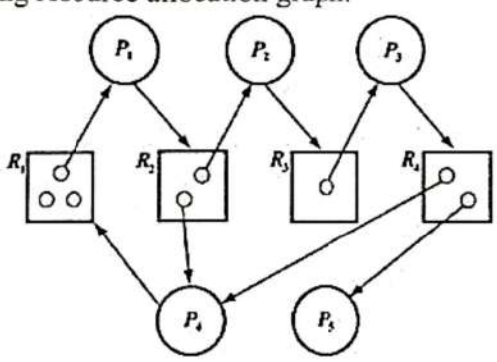
Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science & Engineering
Final Examination, Fall 2025
Course Code: CSE 323 Course Title: Operating Systems
Level: 3 Term: 2 Batch: 64

Time: 02:00 Hrs **Marks: 40**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	In a design studio, five graphic designers are working around a round table. To complete a task, each designer needs two shared resources at the same time: • a graphics tablet on the left • a color calibration device on the right Both devices are shared between neighboring designers in a circular arrangement. At one point, all designers pick up the device on their left side and then try to pick up the one on their right side, which is already in use. As a result, everyone is waiting and no one can continue. i) Identify the problem shown here. ii) Suggest a semaphore-based solution to prevent it.	**5**	**CO2**
2.	Consider the following resource allocation graph.  Do the following problems: i) Convert it to the matrix representation (i.e., Allocation,request and Available). ii) Apply Banker's Algorithm to the matrix. And find if there is a deadlock? If there is a deadlock, which processes are involved? If not, share the safe sequence.	**10**	**CO3**

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3.	*a)*	A system uses fixed partitioning to allocate memory to jobs. The following 7 jobs are waiting for memory allocation. Each job must be placed in a single memory block. Job 1: 95k, Turnaround time 2 Job 2: 180k, Turnaround time 3 Job 3: 60k, Turnaround time 1 Job 4: 210k, Turnaround time 2 Job 5: 135k, Turnaround time 2 Job 6: 75k, Turnaround time 1 Job 7: 155k, Turnaround time 3 Block 1: 100k Block 2: 250k Block 3: 300k Block 4: 150k Apply **First-Fit** memory allocation and show which job is placed in which block.	5	CO3
	b)	Determine the internal fragmentation in each block and justify one effective solution to minimize this memory wastage.	5	
4.	*a)*	Given the following page reference string: 4, 2, 1, 0, 2, 3, 0, 5, 2, 1, 4, 3 Apply the FIFO (First-In-First-Out) page replacement algorithm using 4 and 3 frames and calculate the total number of page faults for both.	5	CO3
	b)	Simulate the same reference string using: 2 frames Analyze the results and identify whether Belady's Anomaly occurs or not. Illustrate the outcome using a comparison graph	5	
5.		Consider the following disk request sequence for a disk: 38, 192, 10, 275, 145, 87, 220, 5, 160, 260, 95, 40, 180. The read/write head is currently at track 150. The time required to move the head across one track is 2 ns. i. Calculate the total number of head movements using the following algorithms: SSTF and C-LOOK ii. Compare the seek time of SSTF and C-LOOK and justify which scheduling policy performs better in this scenario.	5	CO3

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