Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science & Engineering

Final Semester Examination, Fall 2024

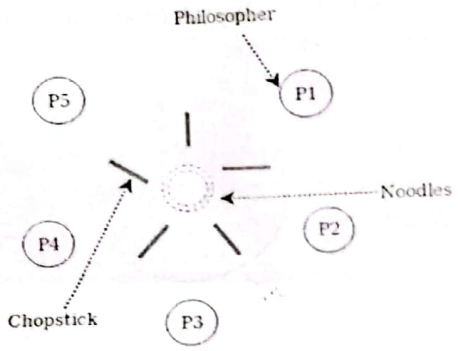
Course Code: CSE 323, Course Title: Operating Systems

Level: 3 Term: 2 Batch: 61

Time: 2:00 Hrs **Marks: 40**

Answer ALL Questions [Optional]

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

1.	***a)***	Five philosophers are sitting at a circular dining table.  **Explain** the above problem with pseudocode. **List** the synchronization challenges of this problem.	**[5]**	**CO2**
	b)	**Inspect** the solution steps for handling those challenges of the above problem with appropriate diagram.	**[3]**	
2.	***a)***	Given a set of processes and three types of resources with the allocation matrix and maximum request matrix of every process. Available resources are: [3, 3, 2]. **Identify** if the system is in a safe state or not. If so, provide the safe sequence of executing the processes.	**[4]**	**CO3**
	b)	If Process **P1** requests additional resources [1, 0, 2] in the problem stated in 2(a), **identify** the updated safe sequence of executing the processes if applicable.	**[4]**	

Process	Allocation	Max
Po	0 1 0	7 5 3
P1	2 0 0	3 2 2
P2	3 0 2	9 0 2
P3	2 1 1	2 2 2
P4	0 0 2	4 3 3
P5	3 4 5	5 47

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3. *a)* The following jobs are to be loaded into memory using fixed partitioning. **[4]** **CO3**

Job	Size	Turnaround
Job 1	20k	1
Job 2	85k	3
Job 3	40k	2
Job 4	12k	1
Job 5	50k	2
Job 6	75k	3
Job 7	30k	1
Job 8	95k	3

Block	Size
Block 1	45k
Block 2	100k
Block 3	60k
Block 4	80k

At each cycle 4 jobs can be allocated in the memory blocks. **Solve** the problem using Worst Fit memory allocation method.

b) **Identify** the problem arises in the memory allocation method stated in 3(a) and **choose** the solution of it. **[4]**

4. *a)* Given a sequence of page references, a number of available frames, and the following page replacement algorithms: **[4]** **CO3**
[1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6]

Apply FIFO page replacement algorithm to determine the number of page faults with frame sizes 2, 3 and 4 and **construct** the graph (page faults vs frame size) to visualize Belady's anomaly.

b) The system's memory is divided into fixed-size pages, with each process allocated 6 pages. The page table for a customer's session contains the following entries: **[7]** **CO4**

Logical Page Number	Frame Number
0	3
1	2
2	1
3	0
4	7
5	6

The system's page size is **16 bytes**. Logical address space is 512 bytes and physical address space is 256 bytes. Given the following logical addresses: 5, 130, 210, 300. **List** the physical addresses using the page table provided and the steps in handling those page faults with appropriate diagram.

5. *a)* A large organization's server experiences high disk I/O requests due to simultaneous access from multiple users. Given a queue of requests: 2, 45, 93, 183, 37, 16, 127, 67, 153, 217, 10, 239, an initial head position at 73 and a disk of 250 cylinders (0–249). Assume each cylinder traversal takes 0.25 milliseconds. **Compare** each disk scheduling algorithm's (SSTF, LOOK and C-LOOK) impact on access time and total head movement, apply decreasing order procedure. **[5]** **CO4**

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