Student Name: University Roll No.:	Printed Pages: 01
School of Engineering **Second Theory Sessional Examination** **Even Semester (AS: 2024-25)**	
B. Tech: CSE/ CS (AI) **[Year:2nd]**	**[Semester:4th]**
Course Title: Operating Systems	**Max Marks: 30**
Course Code: NCS4402	**Time: 1*hr***

Instructions: 1-Mention any assumptions made.
2-Notations have usual meaning.

	SECTION 'A' **Q.N.1. Attempt all parts of the following:**	**Course Objective**	**Marks**
a)	Define a semaphore. Give one example of its use.	CO2	1
b)	What is thrashing in memory management?	CO3	1
c)	What is the difference between internal and external fragmentation?	CO3	1
d)	List any two disk scheduling algorithms.	CO4	1
e)	What is the role of a resource allocation graph in deadlock detection?	CO2	1
	SECTION 'B' **Q.N.2. Attempt any two parts of the following:**	**Course Objective**	**Marks**
a)	Solve the following using the **Banker's Algorithm**: Total resources: A = 10, B = 5, C = 7 Allocation Max P0 = (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) Available: (3, 3, 2) Find whether the system is in a safe state.	CO2	7.5
b)	A process is assigned 4 pages. The page reference string is: 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5. Find the number of **page faults** using **LRU page replacement algorithm**.	CO3	7.5
c)	What is the **Producer-Consumer problem**? Explain how semaphores can be used to solve it.	CO2	7.5
	SECTION 'C' **Q.N.3. Attempt any one parts of the following:**	**Course Objective**	**Marks**
a)	Explain the **Critical Section Problem**. How does **Peterson's Solution** ensure mutual exclusion?	CO2	10
b)	Explain the following with examples: (i)Paging (ii)Segmentation (iii) Virtual Memory	CO3	10
c)	Describe **Disk Scheduling Algorithms** with examples. Solve a numerical problem using **SSTF**: Given disk queue: 98, 183, 37, 122, 14, 124, 65, 67. Initial head position: 53. Calculate total head movement.	CO4	10

Table 1: Mapping between COs and questions

COs	Questions Numbers	Total Marks
CO2	1(a), 1(e), 2(a), 2(c), 3(a)	27
CO3	1(b), 1(c), 2(b), 3(b)	19.5
CO4	1(d), 3(c),	11