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Even Semester Examination 2023

Course Name: Operating Systems **Paper Code: BTCSE403/ BTCSEAI 403**
Time: 3 Hours **Maximum Marks: 75**

Follow proper numbering for answering the questions.

Q.No.	Questions	Marks	CO	BL
	Section-A (All questions are compulsory)	7×5=35		
1	What is Bankers Algorithm? Discuss the Algorithm with the help of all possible data structures that it uses.	5	CO1	L1
2	Briefly define the term scheduler in the context of any operating system. List three aims of the scheduler in any operating system.	5	CO2	L4
3	With the help of a diagram explain all the steps of handling a page fault.	5	CO5	L1
4	Consider a disk with 200 tracks and the queue has random requests from different processes in the order: 55, 58, 39, 18, 90, 160, 150, 38, and 184. Initially arm is at 100. Find the Average Seek length using SCAN and C-SCAN algorithm.	5	CO3	L4
5	Given page reference string: 1, 5, 6, 2, 1, 2, 3, 4, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6 Calculate the number of page faults for five page frames by using Optimal Page Replacement Algorithm.	5	CO3	L3
6	Discuss the concept of Paging with respect to Memory Management.	5	CO3	L5
7	Define the term race condition. Differentiate between race condition and critical region.	2 3	CO1 CO4	L1 L1
	Section-B ***(Attempt any four questions)***	4×10=40		
1	Consider the table: The processes are assumed to have arrived in the order *P*1, *P*2, *P*3, *P*4, *P*5,all at time 0. **a.** Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, a non-preemptive priority (a smaller priority number implies a higher priority), and RR (quantum = 1) scheduling. b. What is the waiting time of each process for each of the scheduling algorithms in part a? c. Which of the schedules in part a results in the minimal average waiting time (over all processes)?	10	CO2	L3

Process	Burst Time	Priority
*P*1	10	3
*P*2	1	1
*P*3	2	3
*P*4	1	4
*P*5	5	2

2	a) Define Deadlock. Explain the necessary conditions for deadlock. b) Consider the following snapshot Answer the following questions using banker's algorithm. i. Is the system is in state? Ii. If the request from process P1 arrives for (0, 4, 2, 0) can the request be granted immediately?	4 3 3	CO4	L1 L4 L4
3	What do you understand by fragmentation? Explain different types of fragmentation and there cause of occurrence. What are the possible solutions to avoid or reduce fragmentation?	10	CO3	L1
4	There are 3 resources (R1, R2, R3) and 4 processes (P1, P2, P3, P4). R1 has 2 instances, R2 has3 instances and R3 has 2 instances. P1 requests R2, R3 and is holding R1,R3. P2 requests R1 and is holding R1,R2. P3 requests R3 and is holding R2. P4 requests for 2 instances of R2, 1 instance of R1 and is holding 1 instance of R2. Design a Resource Allocation Graph (RAG). Find if there exists any deadlock. Write down the assignment edges and request edges.	10	CO5	L4
5	(i)If there are 6 units of resource R in the system and each process in the system requires 2 units of resource R, then how many processes can be present at maximum so that no deadlock will occur? (ii)If there are 100 units of resource R in the system and each process in the system requires 2 units of resource R, then how many processes can be present at maximum so that no deadlock will occur.	10	CO5	L6
6	(i) Explain the conditions which can give rise to deadlock. (ii) Is it possible to have a deadlock involving only one process? Explain your answer.	10	CO3	L3

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

BL-Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3- Applying, 4- Analysing, 5- Evaluating, 6- Creating)