

QUESTIONS

CSN4224 – OPERATING SYSTEM

Question 1

Consider the following set of processes (lowest value is the higher priority), with the length of the CPU-burst time given in milliseconds:

Process	Burst time	Arrival time	Priority
P1	6	0	2
P2	2	2	4
P3	5	3	1
P4	7	4	3
P5	9	1	5

1. Draw the Gantt charts illustrating the execution of these processes using **Preemptive Priority** and **Round Robin (quantum=2)** scheduling.
2. Based on your answer above, calculate the average waiting time for **both** scheduling.

Question 2

Consider the following set of processes (highest value is the higher priority), with the length of the CPU-burst time given in milliseconds:

Process	Burst time	Arrival time	Priority
P1	3	0	2
P2	2	2	4
P3	5	5	1
P4	6	4	3
P5	9	3	5

1. Draw the Gantt charts illustrating the execution of these processes using **Preemptive Shortest Job First** and **Round Robin (quantum=2)** scheduling.
2. Based on your answer above, calculate the average waiting time for **both** scheduling.

Question 3

Consider the following snapshots of a system:

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P ₀	0	1	1	0	0	2	1	0	1	5	2	0
P ₁	1	2	3	1	1	6	5	2				
P ₂	1	3	6	5	2	3	6	6				
P ₃	0	6	3	2	0	6	5	2				
P ₄	0	0	1	4	0	6	5	6				

By implementing Banker Algorithm, solve the following questions.

- Identify the content of the matrix need.
- What are the total resources (A, B, C, D) in this PC?
- Illustrate the sequence of execution that will not result in any deadlock. Show the number of resources available (A, B, C, D) after the completion of the process with your answer in b. Show the final $\langle P_1, P_2, P_3, P_4 \rangle$ satisfies the safety criteria.
- If a new priority request is made by process P1 for (0, 2, 1, 0) resources, can the request be granted immediately? Can the new system be in a safe state? Justify your answer.

Question 4

Consider the following snapshots of a system:

	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P ₀	1	0	1	2	1	1	2	1	1
P ₁	2	1	2	5	4	4			
P ₂	3	0	0	3	1	1			
P ₃	1	0	1	1	1	1			

By implementing Banker Algorithm, solve the following questions.

- Identify the content of the matrix need.
- What are the total resources (A, B, C) in this PC?
- Illustrate the sequence of execution that will not result in any deadlock. Show the number of resources available (A, B, C) after the completion of the process with your answer in b. Show the final $\langle P_1, P_2, P_3, P_4 \rangle$ satisfies the safety criteria.
- If a new priority request is made by process P₂ for (0, 1, 0) resources, can the request be granted immediately? Can the new system be in a safe state? Justify your answer.

Question 5

Given the following **fixed memory blocks** and process sizes, allocate memory using first fit, best fit, and worst fit strategies.

H	U	U	H	H	U	H	U	U	H	H	
0K	45K	75K	110K	165K	200K	280K	350K	405K	415K	490K	600K

* U – Used | H - Hole

The following process requests were received in order:

Process Numbers	Size in Kilobytes
1	57K
2	50K
3	31K
4	109K
5	72k

Show how the memory request above is allocated using each of the allocation schemes below (one process per element):

- First Fit (FF)
- Best Fit (BF)
- Worst Fit (WF)

Question 6

Given the following **dynamic memory blocks** and process sizes, allocate memory using first fit, best fit, and worst fit strategies.

H	U	U	H	H	U	H	U	U	H	H	
0K	45K	75K	110K	165K	200K	280K	350K	405K	415K	490K	600K

* U – Used | H - Hole

The following process requests were received in order:

Process Numbers	Size in Kilobytes
1	40K
2	20K
3	25K
4	57K
5	100K

Show how the memory request above is allocated using each of the allocation schemes below (one process per element):

- i. First Fit (FF)
- ii. Best Fit (BF)
- iii. Worst Fit (WF)

Question 7

Given the reference string: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2.

Assume the availability of FOUR (4) frames and all the frames are initially empty. How many page faults would occur for the following page replacement algorithms. Identify the final pages in the frames.

- i. First In First Out (FIFO)
- ii. Optimal
- iii. Least Recently Used (LRU)

Question 8

Given the reference string: 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5.

Assume the availability of THREE (3) frames and all the frames are initially empty. How many page faults would occur for the following page replacement algorithms. Identify the final pages in the frames.

- i. First In First Out (FIFO)
- ii. Optimal
- iii. Least Recently Used (LRU)